TAMIL NADU AGRICULTURAL UNIVERSITY

TWENTYFIRST ANNUAL REPORT

1991 - 92

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TWENTYFIRST ANNUAL REPORT

April 1, 1991 to March 31, 1992

ACKNOWLEDGEMENT

The whole hearted support of the Chancellor, the Pro-Chancellor, the Chief Secretary and the Secretaries to the State and Central Governments is gratefully acknowleged. The guidance from the members of Board of Management, Academic Council, Research Council, Extension Education Council and Regional Research Councils was of immense help in identifying new horizons of thought and action.

The University is thankful to the Indian Council of Agricultural Research and World Bank for their liberal grants sanctioned for the various developmental programmes. Thanks are due to the State Directorates of Agriculture, Oilseeds, Seed Certification, Agricultural Marketing and Horticulture, State Department of Forests, State Cinchona Department, State Planning Commission, Khadi and Village Industries Board, Government of India, Council of Scientific and Industrial Research, NABARD, Central Coir Board, Coffee Board, TNBCST, Ford Foundation, U.S.A., Rockfeller Foundation, U.S.A., International Food Policy Research Institute, U.S.A., International Foundation of Sciences, Sweden, Swedish International Development Authority, International Atomic Energy Agency, Vienna, International Development Research Centre, Canada, UNICEF, SPIC, IFFCO and various private industries and institutions which have extended financial assistance to the University for undertaking research in specific areas.

It gives immense pleasure to acknowledge the help and co-operation rendered by the officers, teachers, scientists, students, technicians and administrative and supporting staff who have helped in the successful and efficient running of the University. Thanks are due to them for their dedication and team spirit. The University considers as a pride to thank the farming community, agro-industrialists and general public of Tamil Nadu. The continued support received by this University from the people of the State and functionaries at various levels will help to build this institution as a centre of excellence in agricultural research, education, extension and training.

BOARD OF MANAGEMENT

Chairman - Vice-Chancellor	:	Dr. S. Jayaraj
Secretary to Government Agriculture Department and Agrl. Production Commissioner	:	Tmt. Latika D. Padalkar, I.A.S. (upto 31.10.1991) Thiru G. Ranga Rao, I.A.S. (from 1.11.1991)
Secretary to Government Finance Department	:	Thiru N. Narayanan, I.A.S.
Director of Agriculture	:	Thiru Mohan Varghese Chunkath, I.A.S. (upto 31.8.1991) Thiru P. Kolappan, I.A.S. (from 1.9.1991)
Director of Animal Husbandry	:	Dr. T. K. Govindarajan
Director of Fisheries	:	Thiru L. K. Tripathi, I.A.S. (upto 4.7.1991) Thiru R. Poornalingam, I.A.S. (from 5.7.1991)
Principal Chief Conservator of Forests	:	Thiru M. Harikrishnan, I.F.S.
Agricultural Scientist	:	Dr. G. S. Venkataraman (upto 24.11.1991)
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Agro-Industries	:	Dr. B. Vasantharaj David (upto 24.11.1991)
Women Social Worker	:	Sr. Rita Thyveettil (upto 24.11.1991)
Educationist	:	Dr. K. R. Ramaswamy (upto 24.11.1991)
ICAR Nominee	:	Dr. S. Nagarajan
Member of Legislative Assembly	:	Thiru N. S. Palaniswami, M.A., M.L.A. (from 3.10.1991)
Member-Secretary & Registrar	:	Dr. C. Ramaswami

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1. INTRODUCTION

The Tamil Nadu Agricultural University is an autonomous institution conducting research and offering educational programmes at the undergraduate and post-graduate levels in agriculture, horticulture, agricultural engineering, agro-forestry and home science besides undertaking extension education activities through various transfer of technology programmes. The University also provides institutional and research support to the activities of development departments in the State. The twenty first annual report of Tamil Nadu Agricultural University covers the period-1.4.91 to 31.3.92 and encompasses the significant developments and achievements in the fields of education, research and extension education in agriculture and allied sciences. In order to generate the required manpower during the year, 449 students were admitted in the undergraduate programme and 757 students in the post-graduate courses in the six academic campuses of the University. New post-graduate courses leading to Ph.D in Farm Machinery, Processing Bio-energy and Soil and Water Conservation and MSc in Sericulture were started.

The University continued to maintain steady progress in its research activities for achieving the production and high productivity of various crops. Presently there are 312 research schemes in operation in the University. These schemes are funded by various agencies like State Government, ICAR, Government of India, International Organisations like IFPRI, Rockefeller Foundation, Ford Foundation, IRRI and other private agencies. The objectives of the above schemes are transformed into a number of time bound, field oriented and location specific sub-projects. At present there are around 3200 research subprojects in operation covering different branches of Agriculture, Horticulture Agricultural Engineering, Forestry, Food Technology, Basic Sciences, Humanities and Social Sciences. The University has also formulated appropriate research programmes to face the challenges posed by the emerging constraints such as limitation of land and water resources, increasing failures of monsoon and continuing population growth. These projects are field oriented and applied in nature to ensure quick impact on rural economy. Besides releasing high yielding, pest and disease resistant and drought tolerant crop varieties, the University took special efforts to develop several cost effective management technologies and also farm implements to reduce the cost of cultivation and improve the efficiency of inputs. The really important concept of regionalisation of research, was further strengthened through Regional Research and Extension Councils, agro-climatic based research programmes and time bound research sub-projects.

The Regional Research Councils and Scientific Workers' Conference provided ample opportunities for close interaction between the scientists and extension staff and also helped to identify priority areas of research. The major areas of research that received great focus include integrated pest management, biological control of pests and diseases, bio-technology and genetic engineering, farming systems research, environmental science, dry farming, agro-forestry, sericulture, water management, development of new farm implements and tools, women participation and social engineering and upliftment of scheduled castes and other backward communities. Greater emphasis is being laid on "Mission Mode Research" which is an inter-disciplinary and problem oriented research approach to overcome yield barriers in specific crops like rice, groundnut and pulses. The University has also established inter-disciplinary and collaborative research with international research institutes and national funding agencies to further strengthen its research capabilities.

The Directorate of Extension Education is responsible for the out-reach programmes and transfer of technologies developed in various faculties to farmers. To carry out these functions, the Directorate of Extension Education has got several wings like Communication Centres, Krishi Vigyan Kendras, National Demonstration Unit and Plant Clinic Centres located in various agro-climatic regions of the state. The Krishi Vigyan Kendras train farm men, women and youths in agriculture and allied fields through on-campus and off-campus training programmes. Similar to Krishi Vigyan Kendras, the National Demonstration Scheme and Plant Clinic Centres have facilities to train the farmers of the surrounding areas. Communication centre helps in the rapid transfer of information through print media, correspondance courses, Farm School on AIR, audio and video cassettes. The video library unit produces video lessons on different technologies developed in the University.

The training division offers training programmes in agriculture and allied fields. Agricultural Information Service wing of the Directorate convenes weekly meetings on Wednesdays involving identified scientists for immediate dissemination of the latest technologies. Mass media like radio, television, newspaper and farm magazines were utilised to spread new technologies for agricultural production and in allied fields as well. Apart from this, the University also conducts the regional level Farmers' Days, Field Days, exhibitions, etc. and brings out many publications for the transfer of technology to Tamil Nadu farmers.

A students counselling and placement centre is functioning in the University with the objective to provide information on curriculum advancement and helping them to secure good jobs. Coaching classes for competitive examination are organised. The Directorate of Extension Education also helped the farming community in weather forecast, agro-industry, soil, water, fertilizer and pesticides testing besides child care and nutrition services.

Thus through the three pronged approach on Education, Research, and Extension, Tamil Nadu Agricultural University is serving our State in the upliftment of economic status of the farmers at large. The contribution of the University through man power development, trainings, development of new crop varieties and technologies is substantial in all these years. The major achievements of the University in the fields of education, research and extension-education during the year 1991-92 are summarised below :

Education

* During the year 449 students were admitted in the undergraduate programmes and 757 in the post-graduate courses in the four campuses of the University.

* New post-graduate courses leading to Ph. D in Farm Machinery, Processing, Bio-energy and Soil and Water Conservation and M.Sc. in Sericulture were started.

* The Academic Council and Board of Management had approved the starting of the following self-employment courses.

  (i) B. Ag. Tech. (8 Semesters)

  (ii) B.C.A. (2 Semesters)

* The semester system of education has been introduced from 1991 - 92 onwards and the syllabi of all under-graduate and post-graduate programmes have been restructured and new subjects on Commercial Agriculture, NCC, NSS, Computer Application, Bio-technology, Enviromental Science, Development Communication etc. have been introduced at the under-graduate level.

Research

The following new schemes were sanctioned and implemented during 1991 - 92.

University Plan Schemes

* Development of extra early rice variety, Aduthurai.

* Evolving Chilli varieties resistant to mosaic and thrips, Killikulam.

* Programming for diversified production activities for dryland and wasteland, Pudukottai.

* Creation of a new department of Bio-energy, Coimbatore.

* Molecular diagnosis kit for an early detection of bunchy top of banana, Thadiankudisai.

* Evaluation of greengram and redgram genotypes for table purpose, Vamban.

* Setting up a pilot plant for fruits and vegetables based processing industry, Periyakulam.

* Management practices for bamboo under irrigated condition, Mettupalayam.

* Tree improvement in exotic species for wood based industries, Mettupalayam.

* Rice technolgy development, management and utilisation - A farming system approach, Aduthurai.

* Development of varieties resistant to rice blast, sheath rot and ragi blast using tissue culture, Coimbatore.

* Development of pheromones for major pests of rice and cotton, Coimbatore.

* Season specific seed production technology for the development of seed districts in generating quality seed for yield maximisation, Aduthurai.

* Scheme for the exploitation of male sterile lines for developing hybrid cotton, Coimbatore.

* Agro-forestry system for sloppy lands, Uthagamandalam.

* On-farm trials on improved technologies developed for the crops grown in Salem and Dharmapuri districts.

* Variety Release Award - Creation of an Endowment.

Government of India Schemes

* Scheme for characterisation of transluscent prefab dome of fixed dome biogas plants in relation to selective electromagnetic wave length filtering, Coimbatore.

* Environmental risk assessment of pesticides used in hill areas, The Nilgiris, Ooty.

ICAR Schemes

* First line demonstration on pulses, Rabi/Summer crop, Blackgram and Green gram, Vamban and Thanjavur.

* Front line demonstrations on oilseeds - Demonstrations on efficiency of Rhizobium inoculation on oilseeds under the All India Coordinated Research Project on BNF, Coimbatore.

* Front line demonstrations on oilseeds sub - component, Demonstrations of improved package of practices for oilseeds with emphasis on balanced fertilisation through soil testing, Coimbatore.

* Scheme for multilocation trial in sunflower (oilseeds), Coimbatore.

* Front line demonstration for oilseeds-sunflower hybrids, Bhavanisagar.

* Scheme for demonstration and popularisation of improved implements and machinery through Krishi Vigyan Kendra, Pondicherry.

* Front line demonstrations on production potentials of oilseed crops - soybean, Coimbatore.

* Front line demonstrations on oilseeds sub-component, Demonstrations of intercropping/sequence cropping systems involving oilseed crops under rainfed conditions, Kovilpatti.

* Front line demonstration on oilseeds sub - components, Cropping systems research demonstrations on production potential at ECF Centres, Periyakulam and Vellore.

* Front line demonstration in sunflower (Oilseeds), Coimbatore.

* Stand alone fuel cell power plants for rural electrification in India, College of Agricultural Engineering, Coimbatore.

* Front line demonstrations on pulses under National Pulses Development Project (NPDP), Coimbatore and Vamban.

* Front line demonstrations on oilseeds - Popularisation of oilseeds implements and machinery, Coimbatore.

* Studies on the genetic manipulation of algal symbiont *Anabaena Azollae* and induction of sporulation process in Azolla, Coimbatore.

Private Agency Schemes

* Collaborative research project on tapioca, Palur.

* Ecobehavioural studies on the white fly, *Bemisia tabaci* G. in polycrop ecosystem, Coimbatore.

* Medicinal plant based Horti - sylviculture, Periyakulam.

* Establishment of a pilot plant for commercial production of biological control agents, Madurai and Coimbatore.

* Investigations on the Bacterial Insecticide Bacillus (B. T. B.) and its efficacy in the control of certain important crop pests, Coimbatore.

* Evaluation of biopesticide B. T. formulations for its safety to silkworm *(Bombyx mori)*, Coimbatore.

* Seed technological evaluation for quality in cotton, Coimbatore.

* ICMR - Monitoring and surveillance of food contaminants, Coimbatore.

* Scheme for investigation on the microbiology of certain fruit crops and developing suitable bio-fertilizers, Madurai.

State Government Schemes

* Optimization of crop pattern for Periyar-Vaigai Project-Preparation of linear programme models, Madurai.

* Scheme for undertaking the study on maximising the use of water in crop production, Coimbatore.

* Agricultural Development Project-Tamil Nadu (TNADP)-Seed production by Tamil Nadu Agricultural University, Kumulur, Killikulam, Vamban and Palur.

* Agricultural Development Project-Tamil Nadu (TNADP) - Integrated watershed development Component under World Bank Aid-Research component, *Vellore and Athur.*

* Fodder research component under - TNADP - implementation with world bank assistance - Department of Forage Crops, Coimbatore.

International Collaborative Schemes

* Constraints to high rice yield in different rice growing regions in Tamil Nadu, Coimbatore.

* Search for rice sheath blight resistance, Coimbatore.

* Rice bio-technology programme, Coimbatore.

* Communication net work on scarce water management, Coimbatore.

* Collaborative research project on improvement and utilisation of Casuarina *Frankia-mycorrhizal symbiosis for afforestation and agro-forestry in India in* the field of Science and Technology, FRS, Mettupalayam.

Varieties Released

Sixteen new crop varieties were released for general cultivation by the University during January 1992 as a Pongal gift to farmers. The details are as follows :

Rice	:	TKM 10
Redgram	:	Vamban 1
Sesamum	:	SVPR 1
Cotton	:	ADT 1
Sugarcane	:	CoC 92061 Co 8362
Mango	:	Paiyur 1
Sapota	:	PKM 2
Jack	:	Palur 1
Tamarind	:	PKM 1
Palmyrah Palm	:	SVPR 1
Beet root	:	Ooty 1
Rose	:	YCD 2
Gerbera	:	YCD 1
Fodder Cumbu	:	*Co 8*
Guinea Grass	:	Co 1

Apart from varietal improvement work, several new crop management and protection technologies were developed for increasing production and profit of the farmers. The most important ones are listed below :

* Pre - emergence application of anilofos at 0.3 kg/ha + 2, 4 - DEE at 0.4 kg/ha as ready mix gave broad spectrum weed control in rice with least residue hazards and recorded high net return of Rs. 11890/ha with B - C ratio of 2.65.

* Green manure or green leaf manure when applied at the rate of 6.25 t/ha to rice soil and ploughed before transplanting, has been found to reduce the loss of N by about 13 kg/ha which otherwise would have been lost through volatilisation and leaching.

* At Aduthurai, phosphobacterial inoculation with 75% of the recommended 'P' (ie. 37.5 kg P_2O_5/ha) recorded a grain yield of 6.7 t/ha compared to 6.2 t/ha with 75% 'P' alone in rice.

* Use of neem cake coated urea @ 125 kg/ha recorded the highest grain yield of 7.77 t/ha followed by urea gypsum (7.67 t/ha) and these were on par with ordinary prilled urea at 175 kg N/ha in IR 20 rice crop indicating a saving of 50 kg N/ha.

* At Aruppukottai, 40 kg N + 20 kg P_2O_5 as basal application along with the combined application of Azospirillum and Phosphobacteria in both soil and seed treatment has given highest sorghum grain yield of 725 kg/ha over control (215 kg/ha).

* Pre - emergence application of alachlor at 2.0 kg/ha or pendimethalin at 1.0 kg/ha can be recommended for maize + soybean intercropping system for higher returns with no residue problems.

* Application of 10 t/ha of composted coir pith for tannery polluted soils increased the crop yield of maize and ragi and proved as the best soil amendment.

* Agro-techniques for maximum yield for samai crop have been developed at Paiyur.

* In redgram, application of 40 kg P and 20 kg S as gypsum, gave high net return of Rs. 4,965/ha with B/C ratio of 2.4.

* In blackgram (Co 5) basal application of 40 kg P_2O_5/ha (in the from of super-phosphate) and 5 kg of zinc sulphate per hectare recorded a grain yield of 1074 kg/ha as against the check (PO + 5 kg Zn SO_4) which gave only 781 kg/ha at Kovilpatti.

* In soybean, peak flowering stage was the most critical one for moisture stress as evidenced from the lowest grain yield (1982 kg/ha).

* Experiments conducted at Bhavanisagar to study the stages of irrigation in sunflower hybrid BSH 1 revealed that irrigating the crop at vegetative, flowering, button initiation, seed filling and seed development stages consuming 600 mm of water recorded highest seed yield of 1458 kg/ha. Button initiation and flowering stages were found to be the most critical ones.

* Study on intercropping of castor as base crop at Tindivanam revealed that castor yield was the highest if intercropped with groundnut (730 kg/ha). The castor + groundnut combination gave a good income of Rs. 5,500/ha.

* The distillery effluent diluted at 50 times with water recorded the highest cane yield of 144.8 t/ha closely followed by the irrigation water (135.3 t/ha)

* A Portable Mini Silo Kudir for ensiling 100 kg green fodder, made of a gunny bag (60 cm dia and 100 cm height) covered by 600 guage low density polythene bag has been designed and developed.

* The IPM practices to be adoped in rice have been identified as viz., seed treatment with carbendazim, nursery application of carbofuran at 14 kg/8 cents at 15 DAS, split application of N at basal, neem coated urea at tillering and panicle initiation stages, need based application of fungicides, use of neem seed kernel extract 5% instead of insecticides and rodent management using bromodilone and bow trap.

* Among the 11 treatments, acephate (625 g/ha) or monocrotophos (1000 ml/ha) or NSKE 5% recorded significantly the least leaf damage by black rice bug.

* Neem 50 WP at 0.05% and 0.1% gave an effective control of the leaf folder and it was on par with the standard insecticide monocrotophos.

* In field bean *(Dolichos lab lab* var *lignosus), Heliothis* NPV 125 LE / ha + teepol 0.1% + endosulfan 0.07% and NPV 125 LE + teepol 0.1% + endosulfan 0.035% were effective for a good control of pod borers with high grain yields

* A combined treatment of root feeding of monocrotophos @5 ml · 5ml water, spraying of 0.01% monocrotophos followed by the release of parasitoids at every 15 days interval of time was found to give effective control over the leaf eating caterpillar *Opisina arenosella*.

* A simple test for an early diagnosis of Thanjavur wilt disease has been standardised.

* In coconut, barren-nut formation could be corrected after 3½ years of treatment, with extra 2 kg of potash combined with 200 g borax / palm over and above the usual dosage of fertilisers. The nut yield is increased by 4.5 fold compared to pre-treatment stage. The cost benefit ratio is 1.0 : 2.3.

* Cotton (MCU 10) intercropped with cowpea (Co 4) and greengram (Co 4) recorded high net return of Rs. 769 and Rs. 654/ha respectively.

* Application of 20 kg P_2O_5 / ha as enriched farm yard manure at premonsoon sowing and 40kg N/ha at first rains recorded high seed cotton yield (853 kg/ha), blackgram intercrop yield (315 kg/ha) and high net income (Rs. 5287/ha).

* In cotton (Var. MCU 10) the highest kapas yield of 722 kg/ha was recorded when the P was applied through enriched farm yard manure prepared in polysack method.

* To mitigate drought in cotton, spraying of Kaolin 3% twice during peak flowering and boll formation stages is economical with a net profit of Rs. 595 per hectare.

* For rainfed cotton based blackgram intercropping system the pre-emergence application of pendimethalin @ 1.00 kg/ha plus one weeding on 45 DAS with long handle weeder (TNAU model) recorded significantly high yield of kapas (640 kg/ha) and net return (Rs. 6072/ha).

* Seed treatment with 50 ml of either aldrin or chlorpyriphos per kg of seed at the time of sowing was very effective in controlling the surface weevil damage in cotton.

* In the intercropping studies in cotton, blackgram and cluster beans as inter-crops reduced the leafhopper and boll worm incidence in cotton.

* To prevent the contamination and separate the moth scales from the *Corcyra* eggs, a modified air blower working on motor has been developed. The unit can clean 100 cc of eggs in 30 minutes duration in five sortings. The approximate cost of the unit is Rs. 1,600/-

* Spraying Granulosis Virus (GV) twice on 35 and 50 days after planting was effective in controlling shoot borer in sugarcane.

* A quantity of 933.53 quintals of breeder seeds of rice, millets, pulses, oil-seeds, cotton and vegetables were supplied to the Department of Agriculture during the year 1991-92.

* Under turn system of irrigation in Thanjavur district application of Azos pirillum (20 pkts) coupled with extra dose of 50 kg N/ha increased the rice yield from 12.4% to 22.6% over the farmers practice. The increase in net income varied from Rs. 1897 to 2806 per ha.

* The studies on the effect of potassium under different moisture regimes on gingelly at Thanjavur revealed that 60 kg/ha of K_2O as sulphate of potash with 6 splash irrigations gave the highest yield of 901 kg/ha of grain.

* Studies on crop sequence under constraints of irrigation water at Madurai revealed that the new crop sequence viz., groundnut - rice - blackgram gave the highest net return of Rs. 14478/ha which was 20% over the traditional sequence of rice-rice-blackgram (Rs. 11650/-).

* A hand cum pedal operated Chaff Cuttter has been developed for cutting green and dry fodder. It helps to reduce the drudgery of operator. It costs Rs. 1200/-

* Axial Flow pump attachment to power tiller was found very useful to pump large quantity of water at low levels. Its cost is Rs. 4000/-

* A battery operated sprayer has been developed. It is powered by a 6 volts rechargeable battery. It is used for spraying chemicals on crops like ground-

nut, rice, cotton, pulses and vegetables with 50 l/ha rate of application. It costs only Rs. 1100/-

* In the vegetative barriers for moisture conservation experiments in cotton, vettiver and lemon grass treatments recorded high kapas yield. The total soil moisture stored in the vettiver vegetative barrier was 215 mm while the lemon grass stored 207 mm in the root zone upto 45 cm depth.

Transfer of Technology

The Directorate of Extension Education in the University effectively and rapidly disseminated the research information developed at various centres to the farmers. A summary of the activities is presented below :

* The six Krishi Vigyan Kendras conducted on-campus and off-campus training programmes in agriculture and allied activities. A total of 835 training programmes were conducted for the benefit of 20276 farmers, 13233 farm women, 5063 extension workers, 1712 youths and 642 other categories of personnel.

* The scientists of the five plant clinic centres diagnosed various crop maladies and suggested timely solutions. Farm advisory services numbering 497 were organised besides conducting trainings, demonstrations, group meetings, field days and farmers' days.

* The communication centre offered lessons through Farm School on All India Radio and correspondence courses.

* New audio cassette lessons on crop cultivation were prepared and recorded cassettes were sold.

* The video production unit produced 38 general programmes. Totally 13 programmes were telecast through Doordarshan Kendra. About 227 pre-recorded video programmes were sold to Agrl. Officers and farmers.

* The training unit conducted 36 training programmes benefiting 763 participants of state Department of Agriculture, administrators, defence personnel, scientists of Tamil Nadu Agricultural University etc.

* Students' counselling and placement centre organised coaching classes for various competitive examinations, self employment training programmes for farm graduates, campus interviews and also provided information on employment opportunities.

* Timely and need based messages were processed and sent to the mass media and extension functionaries through agricultural Information Service Centres.

Focus for 1992-93

Education

* Starting of new certificate courses for self - employment.
* Starting of new course on B. C. A (Bachelor of Commercial Agriculture) of one year duration offering specialisation in four identified areas.
* Introducing a new degree course on B. Ag. Tech. (Bachelor of Agricultura Technology) of four-year duration.

Research

* Achieving break through in production of oilseeds and pulses.
* Greater emphasis on dry farming.
* Evolving efficient water and fertilizer management practices.
* Systems approach involving crop-livestock integration.
* Breeding crop varieties for regional specificity.
* Evolving genotypes for special situations like drought, salt affected soils, water logged conditions etc.
* Development of high yielding and highly adaptive pest / disease resistant crop varieties.
* Use of bio-technology and genetic engineering in crop and animal improvement.
* Greater emphasis on crop pest and disease management through biological control and plant products.
* Integrated pest and disease management.
* Integrated nutrient management.
* Relatively greater focus on bio-fertilizers.
* Research on farming systems.
* Minimising post-harvest losses in agricultural and horticultural crops.
* Emphasis on Agro-forestry.
* Exploitation of waste lands for agriculture.

* Efficient utilization of agricultural and industrial wastes.

tension Education

* Strengthening the video production unit with more sophisticated equipments.

* Establishing soil-plant health care centres.

* Starting out-reach training programmes.

* Starting intensive training programmes to women in agriculture.

* Strengthening the existing communication centres and establishing new communication centres at Madurai, Killikulam and Kumulur.

2. UNIVERSITY ADMINISTRATION

OFFICERS OF THE UNIVERSITY

Chancellor	:	Shri Bhishma Narayan Singh His Excellency the Governor of Tamil Nadu
Pro-Chancellor	:	Thiru K. P. Krishnan Hon'ble Minister for Agriculture
Vice-Chancellor	:	Dr. S. Jayaraj
Registrar	:	Dr. C. Ramaswami
Director of Research	:	Dr. S. Chelliah
Director of Extension Education	:	Dr. G. Perumal
Dean (Agri)	:	Dr. G. Soundarapandian (upto 13.2.1992) Dr. S. Sankaran (fom 14.2.1992)
Dean (Post-graduate Studies)	:	Dr. M. Gopalan
Dean (Hort)	:	Dr. I. Irulappan
Dean (Agrl. Engineering)	:	Prof. K. R. Swaminathan
Dean (Forestry)	:	Thiru G. Kumaravelu, I. F. S.
Dean, AC&RI, Madurai	:	Dr. S. Sankaran (upto 13.2.1992) Dr. G. Soundarapandian (from 14.2.1992)
Dean, AC&RI, Killikulam	:	Dr. M. Rangarajan
Dean, Tamil Nadu Govt. Agrl. College & Res. Institute, Kumulur	:	Dr. K. M. Ramanathan

Dean, Horticultural College & Res. Instt., Periyakulam	:	Dr. R. Arumugam
Director, School of Genetics	:	Dr. A. Narayanan
Director, Soil & Crop Management Studies	:	Dr. SP. Palaniappan
Director, Centre for Plant Protection Studies	:	Dr. P. Vidyasekaran
Director, CARDS	:	Dr. V. S. Subramanyan
Director, Water Technology Centre	:	Dr. A. Rajagopal
Director, Centre for Plant Molecular Biology	:	Dr. S. R. Sree Rangaswamy
Director, TRRI, Aduthurai	:	Dr. A. Abdul Kareem
Estate Officer	:	Thiru M. Rajagopalan (upto 9.1.1992) Thiru K. R. Bellie (from 10.1.1992)
Comptroller	:	Thiru S. T. Kuttalingam (upto 6.2.1992) Thiru G. Srinivasan (from 7.2.1992)

BOARD OF MANAGEMENT

Chairman Vice-Chancellor	:	Dr. S. Jayaraj
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Member of Legislative Assembly	:	Thiru N. S. Palaniswami, M.A., M.L.A. (from 3.10.1991)
Member-Secretary & Registrar	:	Dr. C. Ramaswami

Meetings of the Board of Management

The Board of Management met five times during the year on 24.4.1991, 3.7.1991, 21.10.1991, 19.11.1991 and 24.1.1992.

The following were some of the important decisions taken by the Board of Management at these meetings :

1. Approved the transfer of KVK to the management of Union Territory Administration.

2. Approved the Annual Report of the University for the year 1990 - 91.

3. Approved the enhancement of age of superannuation of teaching employees from 58 to 60 years from 15.2.89 (ie.) from the date of original resolution passed by the Board of Management.

4. Approved the Balance Sheet of the University for the year 1987 - 88.

5. Approved the TNAU becoming a life member in the Bio-tech.Consortium India Ltd., New Delhi.

6. Approved the allotment of 100 acres of land at Tamil Nadu Government *Agricultural College & Research Institute, Kumulur for the starting of* National Research Centre on Banana by the ICAR.

7. Approved the Award for Best Extension Worker.

8. Approved the award of Rs. 1.00 lakh to the Scientist/Scientists for outstanding research contribution for crop release.

9. Implementation of Govt. orders for redesignation of seven zonal Heads of Research Stations as Associate Directors of Research.

10. Transfer of Wood House Farm at Uthagamandalam from the Department of Horticulture to University.

11. Approved the recruitment policy of Assistant Professors through National Eligibility Test.

Education

1. M. Sc. Sericulture course has been started from the academic year 1991-92.

2. The Academic Council and the Board of Management had approved the starting of the following self - employment oriented courses.

   (i) *B. Ag. Tech. (8 semesters)*

   (ii) B. C. A. (2 semesters)

Academic Council

Chairman

Vice - Chancellor : Dr. S. Jayaraj

Members

Secretary to Government Agriculture Department and Agricultural Production Commissioner	:	Tmt. Latika D. Padalkar, I.A.S. (upto 31.10.91) Thiru G. Ranga Rao, I.A.S. (from 1.11.91)
Dean, Agrl. College and Research Institute Coimbatore	:	Dr. G. Soundarapandian (upto 13.2.92) Dr. S. Sankaran (from 14.2.92)
Dean, Post-graduate Studies, Coimbatore	:	Dr. M. Gopalan
Dean, Horticultural College and Research Institute, Coimbatore.	:	Dr. I. Irulappan
Dean, College of Agricultural Engineering, Coimbatore.	:	Prof. K. R. Swaminathan
Dean, Forest College and Research Institute, Mettupalayam.	:	Prof. G. Kumaravel, I.F.S.
Dean, Agricultural College and Research Institute, Madurai.	:	Dr. S. Sankaran (upto 13.2.92) Dr. G. Soundarapandian (from 14.2.92)
Dean, Agricultural College and Research Institute, Killikulam	:	Dr. M. Rangarajan
Dean, Horticultural College and Research Institute, Periyakulam	:	Dr. R. Arumugam
Dean, Tamil Nadu Government Agricultural College and Research Institute, Kumulur	:	Dr. K. M. Ramanathan
Dean, Pandit Jawaharlal Nehru College of Agriculture, Karaikal	:	Dr. A. Gopalaswamy
Director of Research, Coimbatore	:	Dr. S. Chelliah

Director of Extension Education Coimbatore	:	Dr. G. Perumal
Director, School of Genetics, Coimbatore	:	Dr. A. Narayanan
Director (CARDS), Coimbatore	:	Dr. V. S. Subramanyan
Director (CPPS), Coimbatore	:	Dr. P. Vidyasekaran
Director, Water Technology Centre, Coimbatore	:	Dr. A. Rajagopal
Director, Soil and Crop Management Studies, Coimbatore.	:	Dr. SP. Palaniappan
Director, Centre for Plant Molecular Biology, Coimbatore.	:	Dr. S. R. Sree Rangaswamy
Director, Tamil Nadu Rice Research Institute, Aduthurai.	:	Dr A. Abdul Kareem
Six members among the Heads of Departments nominated by the Vice - Chancellor	:	1. Prof. R. Karunanithi, Professor of Agrl. Engg., Agrl. College & Res. Instt., Madurai. 2. Dr. K. Mayalagu, Professor of Soil Science and Agrl. Chemistry, Agrl. College & Res. Instt., Madurai. 3. Dr. (Tmt) Sukanya Subramaniam, Prof. of Agrl. Botany, Forest College & Res. Instt., Mettupalayam. 4. Dr. A. Mohammed Ali, Professor & Head, Dept. of Agronomy and Soil Science & Agrl. Chemistry, Agrl. College & Res. Instt., Killikulam.

5. Dr. JBM. Md. Abdul Khader,
Prof. & Head,
Dept. of Floriculture & Plantation Crops,
Horticultural College & Res. Institute,
Coimbatore.

6. Dr. T. V. Karivaratharaju,
Professor & Head,
Dept. of Seed Technology,
Coimbatore.

Three members having special knowledge or practical experience in different aspects of Agriculture, nominated by the Vice - Chancellor.

1. Dr. A. Alam
Assistant Director General
(Agrl. Engineering)
ICAR, Krishi Bhavan,
New Delhi - 110 001.

2. Dr. R. Yamdagni,
Regional Director,
Haryana Agrl. University,
Regional Research Station,
Bhawal - 123 501,
(Rewari) Haryana.

3. Dr. C. Sreedharan,
Dean, College of Agriculture,
Kerala Agrl. University,
Vellayani,
Trivandrum - 695 522.

Member - Secretary : Dr. C. Ramaswami

Meetings of the Academic Council

The Academic Council met five times during the period under report. The following important decisions were taken.

1. Accepted the Government order extending the concession to the orphans and destitute children and classifying them under Backward classes.

2. Accepted the proposal of extending the educational concession to christian converts from MBC from the academic year 1990-91.

3. Accepted the change of nomenclature of College of Horticulture at Coimbatore as Horticultural College and Research Institute, Coimbatore.

4. Accepted the change of nomenclature of Horticultural Research Station, Periyakulam as Horticultural College and Research Institute, Periyakulam.

5. Accepted the change of nomenclature of Forest Research Station, Mettupalayam as Forest College and Research Institute, Mettupalayam.

6. Accepted the proposal of appointing Residential Tutors and additional Deputy Wardens in the Hostels.

7. Approved the syllabi for post-graduate degree programmes under semester system.

8. Approved the rules and regulations for UG and PG programmes under semester system.

9. Approved the introduction of new courses on NCC / NSS.

10. Accepted to start PG programme at Horticultural College and Research Institute, Periyakulam.

11. Accepted the proposal of Part-time Ph.D. programme to JRFs / SRFs / Res. Associates / Assistant Professors working in the University.

12. Accepted the creation of (i) Faculty of Home Science (ii) Home Science College and Research Institute and (iii) Board of Studies (Home Science) at AC & RI, Madurai.

13. Accepted the proposal of revision of tuition fees for the UG and PG courses under trimester system.

14. Accepted the syllabus for undergraduate programmes under semester system.

15. Accepted to have a separate Department of Agrl. Microbiology, Crop Physiology and Seed Technology at Agrl. College and Research Institute, Madurai.

16. Accepted the method of evaluation for mid-term and final examination for the Commercial Agriculture Course.

17. Accepted the reservation of seats in B. Sc. (Ag) and M. Sc. (Ag) courses for the Departmental candidates.

18. Accepted the provision of one additional attempt besides the three attempts provided for the supplementary examinations.

19. Accepted the upgrading of one post of Professor as Director of Students Welfare in the cadre of University Officer.

20. Accepted the introduction of external evaluation system in the Semester System of Education.

21. Accepted the creation of the post of Controller of Examinations in the University.

22. Accepted the rules and regulations for the appointment to the post of Associate Director of Research and

23. Accepted for the creation of the post of Director of Publications.

Board of Studies

The Baord of Studies in the Faculty of Agriculture, Agricultural Engineering and Horticulture constituted during 1991 was continued during the period under report. The Board of Studies in Forestry constituted during the year 1989 was also continued. The Board of Studies for Post-graduate Education was reconstituted during the year 1991. Each Board of Studies was constituted with the following members :

1. Dean of the faculty.
2. Other Deans within the faculty.
3. Heads of Departments of concerned faculty.
4. All the Professors of the faculty.
5. Two elected representatives from among the Associate Professors and four from among the Assistant Professors.
6. Two experts in the concerned subjects from ontside the University nominated by the Vice-Chancellor.

Post-graduate Studies

Dean (Post-graduate studies)	:	Chairman
Registrar, Deans and Directors in all Faculties	:	Members

One Professor representing from each faculty of Agriculture, Horticulture, Engineering and Forestry

i) Dr. M. Stephen Durairaj, Professor of Agrl. Botany, School of Genetics, Coimbatore. (Upto 28.12.1991)	;	Faculty of Agriculture

ii) Dr. N. Ramaswamy, Professor of Horticulture, Horticultural College & Research Institute, Coimbatore. (Upto 28.12.1991) : Faculty of Horticulture

iii) Prof. R. Manian, Professor & Head, Z.R.C., College of Agrl. Engineering, Coimbatore. : Faculty of Agrl. Engineering

Two outside experts nominated by Vice-Chancellor

1. Dr. A. Narayanan,
   Professor & Head,
   Dept. of Plant Physiology,
   Agrl. College, Bapatla-522 101.

2. Dr. A. Rama Mohana Rao,
   Dean (Post-graduate Studies),
   Andhra Pradesh Agrl. University,
   Rajendranagar, Hyderabad-500 030.

The Board of Studies for post-graduate education met thrice during the year under report and recommended the following to the Academic Council.

1. Approval of the rules and regulations for postgraduate education under semester system.

2. Educational qualifications for admission to Ph.D. Forestry and Ph.D in Agrl. Engineering.

3. Approval of the proposal for postgraduate syllabi for M.Sc. and Ph.D. programmes under semester system.

4. Starting M.Sc. in Sericulture.

5. Starting M.Sc. (Hort) at Horticultural College and Research Institute, Periyakulam.

6. Review of Topical Research, Thesis Research - suggesitons for improvement.

7. Review of comprehensive examination for Ph.D. and M.Sc. degree programmes, external examiners for thesis evaluation - suggestions.

8. Special lectures to postgraduate students.

9. Offering M.Sc. Water Management course by the Directorate of Water Technology Centre.

10. Completion of the Ph.D. course work within two semesters for part-time candidates.

11. Starting of B.Ag.Tech (8 semesters) programme.

12. Starting of B. C. A. (2 semesters) programme.

Faculty of Agriculture

Associate Professors

1. Thiru C. R. Vijayaraghavan,
Associate Professor,
Department of Agronomy,
Agrl. College & Res. Instt.,
Coimbatore - 3.

2. Dr. N. Nadarajan,
Associate Professor,
Department of Agrl. Botany,
Agrl. College & Res. Instt.,
Madurai - 625 104.

Assistant Professors

1. Thiru P. Nasurudeen,
Assistant Professor,
Dept. of Agrl. Economics,
Tamil Nadu Government Agrl.
College & Res. Instt., Kumulur.

2. Thiru M. Subash Chandra Bose,
Assistant Professor,
Dept. of Forage Crops,
Agrl. College & Res. Instt.,
Coimbatore.

3. Thiru C. R. Anandakumar,
Assistant Professor,
Dept. of Agrl. Botany,
Agrl. College and Research Institute,
Madurai.

4. Thiru A. Balraj,
Assistant Professor of Physics,
Dept. of Agrl. Engineering,
Agrl. College and Research Institute,
Killikulam.

Nominated Members

1. Dr. V. Gopinathan Nair,
Professor & Head,
Dept. of Plant Breeding and
Genetics, College of Agriculture,
Vellayani, Trivandrum.

2. Dr. M. Santharam,
Professor & Head,
Dept. of Soil Science and Agrl.
Chemistry, Andra Pradesh Agrl.
University, Rajendra Nagar,
Hyderabad - 500 030.

The Board of Studies (Agriculture) met thrice during the year under report and recommended the following to the Academic Council.

1. Approval of rules & regulations under semester system for undergraduate students.

2. Approval of discipline-wise list of course-wise syllabi under semester system.

3. Introduction of new courses on NCC/NSS.

4. Approval of revised syllabus for Diploma in Agriculture course.

5. Starting of B.Ag. Tech. and B. C. A. degree programmes.

6. Introduction of external evaluation system.

Faculty of Forestry

Associate Professors

1. Dr. R. Jambulingam,
Professor,
Forest College & Res. Instt.,
Mettupalayam.

2. Dr. Stephen V. Rai,
Professor,
Forest College & Res. Instt.,
Mettupalayam.

3. Thiru A. Shanmugam,
Associate Professor,
Forest College & Res. Instt.,
Mettupalayam.
(From 10.5.1991)

4. Dr. K. Vanangamudi,
Associate Professor
Forest College & Res. Instt.,
Mettupalayam.
(From 10.5.1991)

Assistant Professors

1. Thiru K. K. Suresh,
Assistant Professor,
Forest College & Res. Instt.,
Mettupalayam.

2. Thiru K. Sivagnanam,
Assistant Professor,
Forest College & Res. Instt.,
Mettupalayam.

Nominated Members

1. Dr. S. Chinnamani,
Asst. Director General (Agro-Forestry) ICAR, Krishi Bhavan,
New Delhi - 110 001.

2. Thiru T. C. Ramakrishna,
Deputy Conservator of Forests (Rtd.),
90, Tatabad, Street No. 11,
Coimbatore - 641 012.

The Board of Studies (Forestry) met thrice during the year under report and recommended the following to the Academic Council :

1. Approval of rules and regulations for B.Sc. (Forestry), M.Sc. (Forestry) and Ph. D. programme in Forestry under the semester system.

2. Approval of revised syllabus for undergraduate and post-graduate programmes in Forestry.

3. Introduction of new course on NCC/NSS.

4. Starting of B. Ag. Tech. and B. C. A. degree programmes.

5. Introduction of external evaluation system.

Faculty of Horticulture

Associate Professors

1. Thiru S. Balasubramanian,
   Associate Professor (Horticulture),
   Tamil Nadu Govt. Agrl. College &
   Res. Instt., Kumulur.

2. Thiru V. Ponnusamy,
   Associate Professor (Horticulture),
   Horticultural College &
   Res. Institute, Periyakulam.

Assistant Professors

1. Tmt. D. Sarada Devi,
   Assistant Professor (Hort.),
   Horticultural College & Res. Institute,
   Periyakulam.

2. Thiru M. Selvarajan,
   Asst. Professor (Hort.),
   Sugarcane Res. Station,
   Sirugamani.

3. Thiru L. Puhazhendhi,
   Asst. Professor (Hort),
   Horticultural Res. Station,
   Yercaud.

4. Thiru M. Kannan,
   Asst. Professor (Hort),
   Horticultural College &
   Res. Institute,
   Coimbatore.

Nominated Members

1. Dr. M. N. Khan,
   Professor & Head,
   Division of Horticulture,
   University of Agrl. Sciences,
   GKVK Campus,
   Bangalore - 560 065.

2. Dr. V. Suryanarayana,
   Professor & Head,
   Dept of Horticulture,
   S. V. Agrl. College,
   Tirupathi-517 503.

The Board of Studies (Horticulture) met thrice during the year under report and recommended the following to the Academic Council.

1. Approval of rules and regulations under semester system for undergraduate students in Horticulture and B.Sc. Home Science.

2. Approval of revised syallabus for Horticulture and Home Science degree programmes under semester system.

3. Starting of B.Ag. Tech. and B.C.A. degree programmes.

4. Introduction of external evaluation system.

5. Introduction of new course on NCC / NSS.

Faculty of Agricultural Engineering

Associate Professors

1. Thiru V. Murugesan,
Professor,
Dept. of Bio-energy,
College of Agrl. Engineering,
Coimbatore.

2. Thiru M. Koteeswaran,
Professor,
Soil & Water Conservation,
College of Agrl. Engineering,
Coimbatore.

Assistant Professors

1. Thiru D. Palanisamy,
Asst. Professor,
Soil & Water Conservation,
College of Agrl. Engineering,
Coimbatore.

2. Thiru I, Seegan Paul,
Assistant Professor,
Dept. of Bio-Energy,
College of Agrl. Engineering,
Coimbatore.

3. Thiru. D. Manohar Jesudas,
Asst. Professor,
Dept. of Farm Machinery,
College of Agrl. Engineering,
Coimbatore.

4. Thiru K. Kathirvel,
Assistant Professor,
Dept. of Farm Machinery,
College of Agrl. Engineering,
Coimbatore.

Nominated Members

1. Dr. C. P. Singh,
College of Agrl. Engineering,
Punjab Agrl. University,
Ludhiana.

2. Dr. Nawab Ali.
ICAR Scientist,
Central Instt. of Agrl. Engineering,
Bhopal.

The Board of Studies (Agricultural Engineering) met thrice during the year under report and recommended the following to the Academic Council :

1. Approval of rules & regulations for B. E. (Ag.) programme under semester system.

2. Approval of revised syllabi for B. E. (Ag) under semester system.

3. Introduction of new courses on NCC/NSS.

4. Starting of B. Ag. Tech. and B. C. A. degree programmes.

5. Introduction of external evaluation system.

Recognition Committee

The Recognition Committee met twice during the year under report and recommended the following to the Academic Council. :

1. Considered the M. Sc. (Ag) Horticulture of the Allahabad University, Allahabad for admission to Ph. D. degree programme in Tamil Nadu Agricultural University.

2. Considered the M.Sc. (Bio-Chemistry) degree of the Allahabad University, Allahabad for admission to Ph.D. degree programme in Tamil Nadu Agricultural University for the inservice candidates only.

3. Considered the B Sc. (Home Science) degree awarded by the Manonmaniam Sundaranar University, Tirunelveli for admission to M.Sc. (FSN) of Tamil Nadu Agricultural University.

4. Considered the M.Sc. (Ag) Crop Physiology of Prince of Songkhla University, Thailand for admission to Ph.D. of Tamil Nadu Agricultural University.

5. Considered the B,Sc. (Ag) degree of the University of Nairobi, Kenya for admission to M.Sc (Ag) of Tamil Nadu Agricultural University.

Courses and Curricula

The trimester system of education was followed for the undergraduate and postgraduate degree programmes and Ph.D. programmes of all disciplines upto 1990-91 in the University. From the academic year 1991-92, semester system of education has been introduced for all the undergraduate and postgraduate programmes.

A total number of 8936 application forms for the degree courses in Agriculture, Horticulture, Forestry, Agricultural Engineering and 32 applications for B.Sc. (Home Science) were received.

With regard to postgraduate programme selections were made for 301 seats in 25 disciplines in M.Sc. (Ag.) degree programmes.

The following are the different programmes in the University.

Degree	Subject
B.Sc. (Ag)	Agriculture
B.Sc. (Hort.)	Horticulture
B.E. (Ag.)	Agricultural Engineering
B,Sc. (Forestry)	Forestry

B.Sc. (Home Science)	Home Science
Ph.D. & M.Sc. (Ag.)	Crop Physiology
Ph.D. & M.Sc. (Ag.)	Agricultural Microbiology
Ph.D. & M.Sc. (Ag.)	Plant Pathology
Ph.D. & M.Sc. (Ag.)	Agricultural Entomology
Ph.D. & M.Sc. (Ag.)	Seed Technology
Ph.D. & M.Sc. (Ag.)	Agricultural Extension
Ph.D. & M.Sc. (Ag.)	Agricultural Economics
Ph.D. & M.Sc. (Ag.)	Soil Science & Agrl. Chemistry
Ph.D. & M.Sc. (Ag.)	Plant Breeding & Genetics
Ph.D. & M.Sc. (Hort.)	Horticulture
Ph.D. & M.Sc. (Ag.)	Agronomy
M.Sc. (Ag.)	Sugarcane Production
M.Sc. (Ag.)	Farming System Management
M.Sc. (Ag.)	Plant Protection
M.Sc. (Ag.)	Agrl. Marketing Management
M.Sc. (Ag.)	Plant Nematology
M.Sc. (Ag.)	Water Management
Ph.D.	Agricultural Engineering
M.E. (Ag)	Agro-Energy & Power
M.E. (Ag.)	Farm Power & Machinery
M.E. (Ag.)	Soil & Water Conservation Engineering
M.E. (Ag.)	Post Harvest Technology
M.E. (Ag.)	Water Management
M.Sc. & Ph.D.	Food Science & Nutrition
M.B.M.	Master of Business Management
M.Sc. & Ph.D.	Bio-Technology
M.Sc. & Ph.D.	Environmental Science
M.Sc. & Ph.D.	Forestry
P. G. Diploma in Sericulture	

The candidates selected for various undergraduate and postgraduate degree programmes were approved by the Vice-Chancellor.

During the year under report, number of students passed out and admitted in the different undergraduate degree programmes are furnished below :

Name of the degree programme	No. of students passed	No. of Students admitted
B.Sc. (Ag.)	320	291
B.Sc. (Hort.)	55	55
B.E. (Ag.)	76	92
B.Sc. (Home Science)	10	18
B.Sc. (Forestry)	17	16
	478	472

Postgraduate Education

Following are the number of postgraduate students passed out and admitted during the period under report :

Name of the degree programme	No. of students passed out	No. of students admitted
Masters' degree programme		
M.Sc. (Ag.)	136	206
M.Sc. (Hort.)	6	15
M.E. (Ag.)	10	13
M.Sc. (Bio-technology)	12	8
M.Sc. (Environmental Science)	1	5
M.Sc. (Forestry)	3	5
MBM	7	12
Total	175	264
Post-graduate diploma in Sericulture :	9	
Ph.D. degree programme		
Ph.D. (Agriculture)	33	293
Ph.D. (Horticulture)	1	24
Ph.D. (Agrl. Engineering)	—	27
Ph.D. (Forestry)	—	9
Ph.D. (Environmental Science)	—	9
Ph.D. (Bio-technology)	—	11
Ph.D. (Food Science and Nutrition)	—	3
Total	34	376

Seminars / Symposia / Conferences

* Summer Institute on advances in traction and tillage instruments in tractor implement system at TNAU, Coimbatore. April 1991.

* Scientific workers' Conference (Agriculture) at Coimbatore. April 23-24, 1991.

* Summer Institute on integrated weed management on command area cropping systems. June 19-28, 1991.

* Indo US - SSP International Review Meeting cum Workshop at TNAU, Coimbatore. June 24-26, 1991.

* Scientific Workers' Conference (Horticulture) at Periyakulam. July 4-5, 1991.

* Workshop on moisture conservation techniques for arid zones at Coimbatore. July 9-22, 1991.

* Seminar on better utilisation of water resources at Water Technology Centre, Coimbatore. July 22, 1991.

* Workshop on surface and ground water management at Water Technology Centre, Coimbatore. November 7-20, 1991.

* State Level Plant Protection Workers' meet at Coimbatore. November 18-21, 1991.

* Seminar on utilisation of coir pith in agriculture at TNAU, Coimbatore. November 20, 1991.

* Seminar on Agricultural Information Communication at Coimbatore. November 26-28, 1991.

* Participatory rural appraisal workshop at RRS, Aruppukottai. December 2-10, 1991.

* Workshop on water management for scarcity conditions at Water Technology Centre, Coimbatore. December 9-18, 1991.

* Participatory rural appraisal workshop at RRS, Paiyur. December, 10-21, 1991.

* Workshop on use of plastics in agriculture at Coimbatore. January 21-30, 1992.

Trainings / Farmers' Days

* Training on oilseed crop cultivation at Oilseed Research Station, Tindivanam. May 7, 1991.
* One day training in dryland farming at Regional Research Station, Aruppukkottai. June 15, 1991.
* Farmers' Day at Palmyrah Research Station, Srivilliputhur. June 29, 1991.
* Farmers' day at Cotton Research Station, Srivilliputhur. June 29, 1991.
* One day training on fruit processing at RRS, Aruppukottai. July 2, 1991.
* State Level Training Programme on Millets at AC & RI, Killikulam. July 17-19, 1991.
* Training on tapioca cultivation at Vegetable Research Station, Palur. July 20, 1991.
* Training on seed production technology at TNAU, Coimbatore. August 8, 1991.
* Training on pelleting and processing for pulses and oilseeds at TNAU, Coimbatore. August 14, 1991.
* Training on plant protection in oranges at Horticultural Research Station, Thadiyankudisai. August 21, 1991.
* Training on the use of biofertilizers at TNAU, Coimbatore. August 28, 1991.
* Farmers' Day at AC & RI, Madurai. September 1, 1991.
* Training on farm implements and equipments at HC&RI, Periyakulam. September 4, 1991.
* State Level Training programme on rice production technology at TRRI, Aduthurai. September 4-6, 1991.
* Farmers' day at National Pulses Research Centre, Vamban. November 16, 1991.
* Training on Agro-forestry at TNAU, Coimbatore. December 2-21, 1991.
* Training on horticultural crops at AC&RI, Periyakulam. December 12, 1991.
* Farmers' day at Regional Research Station, Paiyur. December 20, 1991.
* Farmers' Day at PCC, Srivilliputhur. December 23, 1991.
* Farmers' Day at main campus, Coimbatore. January 9, 1992.
* Farmers' Day at Regional Research Station, Aruppukottai. January 21, 1992.

Dr. B. El Ahmer and Mr. M. H. Ahamed Sudan, IDRC Scientists visited RRS, Vridhachalam on April 1, 1991.

Dr. S. Wanmali, IFPRI, Washington visited the Department of Agricultural Economics, AC & RI, Madurai on April 1, 1991.

Dr. C. Richard Edwards, Entomologist, Purdue University visited Paddy Breeding Station, TNAU, Coimbatore on April 17, 1991.

Shri Bishma Narayan Singh, His Excellency the Governor of Tamil Nadu visited TNAU Main campus, Coimbatore on May 3, 1991.

Tmt. Latika D. Padalkar, Agrl. Production Commissioner, Govt. of Tamil Nadu visited Horticultural Research Station, Ooty on May 19, 1991.

Dr. T. K. Khosala, Dean, College of Forestry, Solan and Dr. Gangobadayoy, Scientist (NARP), ICAR, New Delhi visited Horticultural College and Res. Instt. Periyakulam on July 17, 1991.

Thiru K. P. Krishnan, Hon'ble Minister for Agriculture, Govt. of Tamil Nadu visited TNAU on July 17, 1991.

Dr. N. C. Panda, Dean, College of Veterinary Sciences, Orissa and Dr. P. K. Khosla, Director, Extension Education, College of Forestry Research, Himachal Pradesh visited Tamil Nadu Government Agrl. College and Res. Institute, Killikulam on July 19, 1991.

Prof. Hiroyoki Nishimura, Kyota University, Kyota visited KVK, Kattupakkam on July 20, 1991.

Dr. Wilkinson, Consultant, International Agricultural Training Programme, London visited KVK, Kattupakkam on September 10, 1991.

Dr. S. Jayaraj, Vice-Chancellor, TNAU inaugurated the students club at Forest College and Research Institute, Mettupalayam on September 26, 1991.

Dr. C. T. Wheeler, U.K. and Dr. Ahloowalia, Ireland visited the Centre for Plant Molecular Biology, TNAU, Coimbatore on October 4, 1991.

Dr. Catherine Manaw, Dept. of Human Development and Family Science, Oregan, U.S.A., visited the Dept. of Food Science, AC & RI, Madurai on October 10, 1991.

* Thiru K. P. Krishnan, Hon'ble Minister for Agriculture, Govt. of Tamil Nadu visited Horticultural Research Station, Vijayanagaram on October 11, 1991.

* Dr. S. K. De Datta and Dr. K.G. Canman, Scientists, IRRI, Manila, Philippines visited Rice Research Station, Tirur on October 12, 1991.

* Thiru K. P. Krishnan, Hon'ble Minister for Agriculture, Govt. of Tamil Nadu, visited Agricultural Research Station, Pattukottai on November 17, 1991.

* Dr. D. L. Hawksworth, Director, International Mycological Institute, Kew, England visited the Department of Nematology, TNAU, Coimbatore on November 27, 1991.

* Thiru K. P. Krishnan, Hon'ble Minister for Agriculture, Govt. of Tamil Nadu inaugurated the Trainees' Hostel at Forest College and Research Institute, Mettupalayam on January 1, 1992.

* Thiru N. Rangasamy, Hon'ble Minister for Agriculture, Govt. of Pondicherry visited KVK, Pondicherry on January 9, 1992.

* Dr. Jan Lindquist, Professor, Linkoping University, Sweden visited HC & RI, Periyakulam on January 29, 1992.

* Dr. Robert H. Sohacht, Professor of Adult Education, University of Wisconsin visited AC & RI, Madurai on February 2, 1991.

* Dr. Roy Steiner, Rocke Feller Foundation, USDA and Dr. R. P. Gupta, Project Coordinator, Soil Physics scheme visited Department of Soil Science, TNAU, Coimbatore on February 2, 1992.

* National Science Day was celebrated at TNAU, Coimbatore on February 24 - 28, 1992.

FOREIGN VISITS

List of scientists deputed abroad to participate in training/workshop/syposium/seminar etc. during 1991-92.

Sl. No.	Name and Designation	Country visited	Period	Purpose
1.	Dr. T Rathakrishnan, Assistant Professor (Agrl. Extn.) Coimbatore	IFPRI, Washington	Three weeks in April 1991	For writing final draft report of IFPRI-TNAU Collaborative Research Project
2.	Dr. S. Kannaiyan, Professor (Bio-technology) Coimbatore	Nepal	April 15-19, 1991	International Conference on "Genetic Engineering and Bio-technology"
3.	Dr. G. Santharam, Professor (Agrl. Entomology) Coimbatore	Tokyo, Japan	May 91, Ten days	Training Programme on the use of Electron Microscope at JEOL Ltd., Japan
4.	Dr. T. M. Thiyagarajan, Assoc. Professor (SS & AC) TRRI, Aduthurai	Malaysia	May 6-11, 1991	Workshop on Nutrients, Water and Roots in Rice Production at University of Pertanian, Malaysia under SARP Project
5.	Thiru M. N. Budhar, Asst. Professor (Agronomy) TRRI, Aduthurai	-do-	-do-	-do-
6.	Thiru S. Mohandass, Asst. Prof. (Crop Physiology) TRRI, Aduthurai	-do-	-do-	-do-

7.	Thiru M. Selvarajan, Asst. Prof. (Agrl. Engineering) WTC, Coimbatore	Malaysia	May 6-11, 1991	Workshop on nutrients, Water and Roots in Rice Production at University of Pertanian, Malaysia under SARP Project
8.	Thiru S. Ramasamy, *Asst. Professor (Agron.)* Coimbatore	-do-	-do-	-do-
9.	Mrs. N. Punitha, Asst. Prof (Ag. Econ.), Coimbatore	BRRI, Bangaladesh	May 18-31, 1991	Training on "Gender analysis and application to rice based farming *systems research*" held at BRRI, Joydapur, Bangaladesh
10.	Dr. C. Chinnamuthu, Post-Doctoral Fellow (Agronomy) Coimbatore	IRRI, Manila, Philippines	May 20 - July 6, 1991	IRRI - TNAU Collaborative Project on varietal screening for N uptake and utilisation
11.	Mrs. A. Susheela Thirumaran, Professor (Food Science & Nutrition), Coimbatore	Tuskegee, University, Alabama, U.S.A.	June 10-13, 1991	International symposium on sweet potato technology for the 21st century.
12.	Thiru SP. Ramanathan, Assistant Professor, (Agron.), TRRI, Aduthurai	IRRI, Manila	July 22 - Nov. 8, 1991	INSURF Training Course.
13.	Dr. S Kannaiyan, Professor (Bio-technology), Coimbatore	University of London, U.K.	July 22 - Oct. 10, 1991	To visit Kings College, University of London, U.K. to work with the algal symbionts of Azolla under British Council's Academic Link Programme.
14.	Dr. S. Purushothaman, Prof. and Head, Dept. of Agronomy SCMS, Coimbatore	Yangon, Myanmar	Aug. 2-6,	Rainfed low land farming system meeting held in Myanmar. Asian rice farming system

15.	Thiru I. Muthuchamy, Asst. Prof. (S & WC), FC & RI, Mettupalayam	**University of Karlsfuke Germany**	**One year from 6.8.1991**	**Academic Exchange Service 1991-92 in PG Course Tropical Engineering**
16	Dr. C. Ramasamy, Professor (Agrl. Economics), Coimbatore	IRRI, Manila	Aug. 13-18, 1991	IRRI Collaborative Project - Methodology Workshop held at IRRI, Manila.
17.	Dr. C. Dharmalingam, Professor (Seed Tech), Coimbatore	Sweden	Nine months from August 1991	To undertake research programme at Swedish University of Agricultural Sciences, Sweden.
18.	Thiru V. Rajendran, Asst. Prof. (S & WC) RRS, Paiyur	IRRI, Manila, Philippines	26.8.91 to 4.10.91	Training course on irrigation and water management held at IRRI, Manila, Philippines.
19.	Dr. A. Baskar, Asst. Prof. (SS & AC), Coimbatore	Massey University, New Zealand	August 1991 to July 1993	Post-Doctoral Fellowship at Massey University, New Zealand
20.	Dr. P. Balasubramanian, Assoc. Professor (Pl Pathology) HRS, Thadiyankudisai	University of California, Davis, U.S.A.	1.9.91 to 31.8.92	Award of Post-Doctoral Fellowship in Plant Tissue Culture, U.S.A.
21.	Thiru M. Maheswaran, Asst. Prof. (Ag. Bot.), AC & RI, Killikulam	IRRI, Manila	Two years from September 1991	To undergo Ph.D. Research programme at IRRI, Manila under Rockefeller Foundation Scholarship
22.	Thiru R. Vijayaraghavan, Asst. Prof. (Micro), AC & RI, Killikulam	U.S.A.	Three years from 20.8.91	To undergo his Ph.D. programme at Georgia University, U.S.A.

23.	Dr. N. M. Ramaswamy, Professor and Head, Dept. of Plant Molecular Biology & Biotechnology Coimbatore	Tuscon, Arizona, U.S.A.	Oct. 2-12, 1991	Fifth Annual Meeting of Rockefeller Foundation International Programme on Rice Biotechnology and other two conferences
24.	Dr. S. Mohandass, Asst. Prof. (Crop Physiology), TRRI, Aduthurai	Bangkok, Thailand	19.11.91 to 6.12.91	International Symposium on Systems Approaches for Agricultural Development (SAAD) held at Bangkok. Thailand.
25.	Dr. A. Abdul Kareem, Director, TRRI, Aduthurai	Bangkok, Thailand	Dec. 2-6, 1991	International Symposium on Systems Approaches for Agricultural Development (SAAD) held at Bangkok, Thailand.
26.	Dr, V. Narasimhan, Professor (Plant Pathology), TRRI, Aduthurai	-do-	-do-	-do-
27.	Dr. T. M. Thiyagarajan, Assoc. Professor (SS & AC), TRRI, Aduthurai	-do-	-do-	-do-
28.	Dr. K. Palanisamy, Assoc. Professor (Agrl. Econ.), WTC, TNAU, Coimbatore	-do-	-do-	-do-
29.	Dr. M. Selvarajan, Asst. Professor (S & WC), WTC, Coimbatore	-do-	-do-	-do-
30.	Dr. S. Thangavelu, Professor & Head, RRS, Vridhachalam	Sudan	Dec. 18-31, 1991	To conduct review and evaluation of IDRC oil crops network.

31.	Dr. S. Ramasamy, Asst. Prof. (Agron), Coimbatore	Bangkok, Thailand	Dec. 2-6, 1991	International Symposium on System Approaches for Agricultural Development (SAAD)
32.	Thiru M. N. Budhar. Asst. Prof. (Agron), Coimbatore	-do-	-do-	-do-
33.	Thiru F. John Samuel Kennedy, Asst. Prof. (Entn.), ARS, Aliyarnagar	University of Catholique, Belgium	Four years from 1.8.91	Ph.D. programme in Entomology
34.	Thiru O. Timothy Randhir, Asst. Prof. (Econ.), Coimbatore	Purdue University, U.S.A.	Four years from Aug. 91	Ph.D. programme in Agricultural Economics
35.	Thiru I. Mohamed Iqbal, Asst. Professor (Agrl. Extension), RRS, Paiyur	IRRI, Manila, Philippines	3.2.92 to 23.4.92	Training and technology transfer course
36.	Dr. SP. Palaniappan, Director, SCMS, Coimbatore	Bangkok, Thailand	Feb. 17-25, 1992	International symposium on strategies for utilizing salt affected lands
37.	Dr. S. Kannaiyan, Professor (Bio-technology), Coimbatore	-do-	-do-	-do-
38.	Thiru S. Jaisankar, Asst. Professor (Hort.), Periyakulam	University of Florida. U.S A,	4 years from 13.12.91	For higher studies (Ph.D.)

FINANCE AND ACCOUNTS

The following statement indicates the classified summary of the transactions of the University during 1991-92.

Details		Amount (Rs. in lakhs) (Unreconciled and unaudited figures)
Receipts		
Agriculture		
Non Plan	1100.00	
Plan	1207.44	2307.44
ICAR Grant		
ICAR (Fully financed), ICAR (Partly financed)	619.09	
Development Grant	56.00	675.09
Government of India Schemes		127.91
Outside Agencies		
Foreign and Indian Agencies, Research Schemes		72.28
Other Receipts		
Agriculture (Fee, rent, farm receipts etc)		243.00
Loans and Advances including deposit		55.00
	Total	3480.72
Expenditure		
1. Agriculture Non-Plan		1,285.00
2. Agriculture Plan		1,234.27
ICAR Fully financed schemes - including National Agrl. Research Project and KVK, Pondicherry, ICAR Partly financed schemes		628.37
Government of India Schemes		122.76
Other Agencies		69.65
ICAR Development Grant		56.00
Deposit transaction including Loans & Advances		125.00
	Total	3521.05

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Outside Agencies		
Foreign and Indian Agencies, Research Schemes		72.28
Other Receipts		
Agriculture (Fee, rent, farm receipts etc)		243.00
Loans and Advances including deposit		55.00
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Government of India Schemes		122.76
Other Agencies		69.65
ICAR Development Grant		56.00
Deposit transaction including Loans & Advances		125.00
	Total	3521.05

The Finance Committee at its 40th meeting considered and recommended the budget estimate of 1991-92 of Tamil Nadu Agrl. University and recommended the estimate to the Board of Management. The annual audited accounts for the year 1989-90 have since been finalised. As the acconnts for 1991-92 are yet to be compiled and sent to audit the figures furnished for the year 1991-92 will be treated as provisional.

University Budget Estimate for 1992-93

Subject to approval of full annual financial estimate of Tamil Nadu Agricultural University for the year 1992-93 by the Government, the estimates are tentatively fixed as detailed below:

		(Rs. in lakhs)
Gross appropriation	:	Rs. 3,680.73
Net grant by the State Government	:	Rs. 2,538.43
Grants from ICAR including the implementation of ICAR development grants & NARP schemes	:	Rs. 580.26
Government of India	:	Rs. 179.89
Other Agencies	:	Rs. 62.50
University Receipts	:	Rs. 319.65
Total	:	Rs. 7,361.46

3. EDUCATION

AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE, COIMBATORE

Dr. G. Soundarapandian continued as Dean (Agri), Coimbatore. The college offered B. Sc. (Agri) degree programme under the trimester system. The particulars of students on roll (boys ond girls) in different years of degree programme are furnished below.

Degree Programme	Year	Boys	Girls	Total
B.Sc. (Agri)	I	36	40	76
	II	55	25	80
	III	35	93	128
	IV	32	82	114

Educational Tour

Study tours were conducted for III Year B.Sc. (Ag) students under the course AGR 305 (0+1). For AGR 205, students were taken in two batches to the following research stations.

1. Sugarcane Research Station, Sirugamani
2. Tamil Nadu Rice Research Institute, Aduthurai
8. Sugarcane Research Station, Cuddalore
4. Krishi Vigyan Kendra, Pondicherry
5. Agricultural Research Station, Vridhachalam and
6. Horticultural Research Station, Yercaud

The students were exposed to the different agro-climatic regions and taught about the existing cropping pattern, soil types, common package of practices and socio-economic conditions of the local farming community.

For AGR 305, 132 students were taken in two batches to the following research stations of the southern districts.

1. Horticultural Research Station, Periyakulam
2. Cotton Research Station, Srivilliputhur
3. Model Orchard, Courtrallam
4. Rice Research Station, Ambasamudram
5. Fisheries College and SPIC, Tuticorin
6. Agricultural Research Station, Kovilpatti
7. Regional Research Station, Aruppukottai
8. Agricultural College and Research Institute, Madurai and
9. Tobacco Research Station, Vedasanthur

The All India Study tour for the year 1991-92 will be organised during August-September, 1992.

Village Stay Programme

The final B.Sc. (Ag) students will undergo one month Village Stay Programme. The students (both boys and girls) will be placed in different locations in the districts of Periyar, Salem and Dharmapuri. They will study the socio - economic characters of the rural families especially the farmers. They will also learn different methods of farming by closely associating and interacting with them. Identified TNAU staff members and the officials of the State Departments of Agriculture and Horticulture will be involved in guiding the students during their stay. During the village stay programme, the students organised group meetings, exhibitions and conduct a number of method demonstrations on the latest agricultural techniques, viz., importance of biofertilizers, mushroom cultivation, rat control, coir pith compost, seed hardening etc. Besides, the students also conduct tree planting campaigns and adult education programmes in villages.

Scholarships

Many scholarships were made available to the students. The following is the list of scholarships availed by the students.

Sl No.	Name of the Scholarship	No. of recipients	Total amount
1.	SC Scholarship	47	1,41,333
2.	SC Loan Scholarship	56	84,000
3.	BC/MBC Scholarship	119	1,09,565
4.	National Merit Scholarship	20	58,400
5.	Gandhi Memorial Scholarship	1	1,000
6.	Pondicherry Post Metric Scholarship	10	26,572
7.	Andaman Nicobar Administration Scholarship	11	34,028
8.	TNAU Merit Scholarship	31	26,340
9.	Perarignar Anna Award	1	1,000
10.	Indo-Ethiopian Cultural Exchange Scholarship	1	14,040
11.	General Cultural Scholarship	3	60,720
12.	Award of Prize Money to SC/ST students securing 60% marks in Post - Metric Level	6	9,000

Students Hostel

The students including boys and girls were accommodated in various hostels. Seven messes were functioning efficiently and economically on the basis of dividing system. The mess representatives nominated by the warden in consultation with the students managed the messes successfully. Most of the academic requirements, viz., record note books, herbarium sheets, etc. besides eatables and cosmetics for the students were supplied by the Students' Canteen. The University Medical Officer took care of the medical facilities of the inmates of the hostel. The lady Medical Officer was attending to the medical needs of girl students in Ladies' Hostel by visiting the hostel daily between 4.00 and 5.00 p. m.

Students Club

Students Club get-together function was conducted on 9.8.91. Dr. G. Soundrapandian, Dean (Agri) presided over the function and Dr. S. Jayaraj, Vice - Chancellor, TNAU was the Chief Guest.

Social Service League students celebrated Independence Day on 15.8.91 at night school premises in a grand manner. Dr. C. Ramaswami, Registrar, TNAU hoisted the national flag and distributed sweets to night school children.

Debating Society arranged for a special lecture of Thiru Nanjil Nadan on 28.8.91. Dr. G. Soundrapandian, Dean (Agri) presided over the function and presented a memento to the Chief Guest.

TNAU Main Campus Rotract Club students organised free immunisation camp at TNAU Hospital on 25.9.91. Dr. S. Jayaraj, Vice-Chancellor, TNAU inaugurated the camp and the Dean presided over the function.

DRUMS - 91 Inter Faculty cultural competition was conducted in a grand manner from 2.9.91 to 4.9.91. Prof. K. R. Swaminathan, Dean (Agri. Engineering) inaugurated and Thiru G. Kumaravelu, I.F.S, Dean (Forestry), presided over the function. Dr. I. Irulappan, Dean (Hort) delivered the welcome address. Dr. M. Gopalan, Dean (P. G. Studies) was the Chief Guest. Dr. G. Soundrapandian, Dean (Agri) delivered the valedictory address on the final day. Dr. Murugan, Dean, Coimbatore Medical College was the Chief Guest and distributed the prizes to the winners in various competitions.

Muthamil Vizha was inaugurated on 30.9.91 and Dr. G. Soundrapandian, Dean (Agri) presided over the function. Mr. Ashokkumar, M.Sc., B.L., District Sessions Judge, Special Court, Coimbatore was the Chief Guest.

Sports and Games

Annual Sports Meet for the year 1991 was conducted from 12.8.91 to 14.8.91 in a grand manner. Dr. G. Soundrapandian, Dean (Agri) took the salute and declared open the sports meet. Dr. S. Jayaraj, Vice-Chancellor, TNAU presided over the function. Thiru Jasbir Singh Bajaj, I.A.S., Additional Collector, Coimbatore was the Chief Guest and he distributed the prizes to the winners.

College volley ball, foot ball, tennis,, cricket, kabadi and table tennis teams participated in many friendly matches and tournaments and exhibited their talents.

PED 101 (0 + 1) Physical Education course is being offered to I, II and III year B. Sc. (Ag), B. E. (Ag), B. Sc. (Hort) and Forestry students.

Tmt. D. Sathiavani, Lady Physical Director attended the "Scientific Workshop on Sports Injuries" at Kovai Medical Centre on 29.1.1992 organised and conducted by Kovai Medical Centre and Bharathiar University jointly.

NCC Activities

The NCC has been introduced as one of the courses in the undergraduate degree programmes from 1991 - 92 in the semester system of education, A total of 100 cadets from I year (49), II year (31) and III year (20) degree programme enrolled in NCC.

The senior NCC cadets participated in the Annual Training Camp held at Bhavanisagar from December 24, 1991 to January 3, 1992. Thiru M. Nagasundaram, Final Year B.Sc. (Forestry) student was selected as the best NCC cadet for the year 1991 - 92.

National Service Scheme

The National Service Scheme of the TNAU has 800 student volunteers in all the constituent colleges. There are nine Programme Officers to carry out effectively the NSS activities by the volunteers. Several service activities like blood donation, tree planting, parthenium eradication, collection of relief material to the earthquake affected people, adult education and road relaying were carried out by the student volunteers in all the campuses. The volunteers also participated in transfer of technology programmes such as Integrated Pest Management, Children Immunisation Programme and other important university functions such as Farmers' Day. New NSS Units have been started in the Horticultural College and Research Institute, Periyakulam and the Forest College and Research Institute, Mettupalayam.

HORTICULTURAL COLLEGE AND RESEARCH INSTITUTE, COIMBATORE

Dr. I. Irulappan continued as the Dean (Hort) during the period under report. The Faculty of Horticulture continued to offer B. Sc. (Hort), M. Sc. (Hort) and Ph.D degree programmes under the trimester system of education. The faculty also offered courses to B. Sc. (Ag), B. Sc. (Forestry) and B. E. (Ag) degree programmes.

Admission

The number of students on roll in I, II, III and IV year B. Sc. (Hort) is as follows :

Class	Boys	Girls	Total
I. B. Sc. Hort	—	—	—
II. B. Sc. Hort	—	—	—
III. B. Sc. Hort	21	33	54
IV. B. Sc. Hort	25	33	58

Educational Tour

Final B. Sc. (Hort) students numbering 54 underwent an educational tour for two weeks. They visited plantation areas at Kanyakumari, Courtallam, Veppankulam and Vridhachalam for the study of rubber, coconut, palmyrah and cashew. They were given intensive training in production technology of tea at Krishi Vigyan Kendra, Coonoor for a period of one week. An All India tour was also arranged for the benefit of the students. Fifty six students participated in the tour. The students visited a number of research and educational institutions of national repute in Karnataka, Delhi, Uttar Pradesh and Haryana States.

COLLEGE OF AGRICULTURAL ENGINEERING, COIMBATORE

Prof. K. R. Swaminathan, continued as Dean (Engg.). The faculty continued to offer B. E. (Ag.) degree programme, M. E. (Ag.) degree programme in Soil and Water Conservation, Farm Machinery and Power, Post Harvest Technology and Agro-energy and Power and Ph. D. programme besides offering courses in Agricultural Engineering for B. Sc. (Ag.), B. Sc. (Forestry) and B. Sc. (Hort) students.

Admission

Eighty seven students were admitted to I B. E. (Ag.) course. The first trimester for the I B. E. (Ag) commenced on 10.10.91 and for the II, III and final B. E. (Ag.) on 8.11.91, 2.1.91 and 2.1.91 respectively. The number of students as on roll in I, II, III and IV year B. E. (Ag.) was as follows :

Class	Boys	Girls	Total
I B. E. (Ag.)	64	23	87
II B. E. (Ag.)	74	33	107
III B. E. (Ag.)	56	14	70
IV B. E. (Ag.)	82	13	95
Supplementary students	48	2	50
Total :	324	85	409

Educational tour

The III B. E. (Ag.) students were on Tamil Nadu tour from 24.9.91 to 1.10.91 and they visited the following industries and institutions :

Seshasayee Paper Mills, Erode; Sago Factory, Micro level hydro electric project, Mettur Chemicals and Metkem Silicon, Mettur Dam; NAFED Processed Foods, and Institute of Hydraulics and Hydrology, Vellore; T. T. T. I. and J. Farm, Madras; Sri Murugappa Chettiar Research Institute, Tharamani; Drip Irrigation System, Mahabalipuram; CIPET, Guindy; Integral Coach Factory, Perambur; National Engineering Company Ltd., Ambatur; Thermal Power Station, Neyveli; Annamalai University, Chidamparam; PPRC and Modern Rice Mill, Tiruvarur; BHEL, Bharathidasan University, School of Energy, Irrigation Management and Training Institue, KVK and SSRC and Grand Anaicut, Trichy; Cauvery Sugar and Chemicals, Pettaivaithalai; Pugalur Paper Mills, Pugalur; and Pongalur Watershed, Pongalur.

The final year students went on All India Study Tour from 3.3.92 to 13.3.92 and they visited the following Institutions and Industrial organisations :

a) IARI and WTC, New Delhi

b) Soil and Water Conservation Training and Research Institute and Forest Research Station, Dehradun.

c) Soil and Water Management Centre, Agra.

Scholarship

Details of scholarships awarded during 1991-92 are detailed below :

S.No.	Details of Scholarships	No. of recipients
1.	ICAR Merit Scholarship	30
2.	Scheduled Caste Loan	52
3.	Scheduled Caste Scholarship	50
4.	Teacher's Welfare Scholarship	2
5.	Backward Classes Scholarship	78
6.	TNAU Merit Scholarship - UG	30
7.	National Merit Scholarship	16
8.	Govt. of Pondicherry Scholarship	2
9.	Ex-Servicemen Scholarship	2
10.	USAID - Scholarship	2
11.	CFTC Scholarship	1
12.	Arunachal Pradesh Govt. Scholarship	2
13.	Nagaland Govt. Scholarship	2
14.	Indo-Ethiopian Exchange Cultural Programme Scholarship	3
15.	Jammu and Kashmir State Loan Scholarship	1
16.	Gandhi Memorial Prize Award	1
17.	S. J. Jindal Trust Scholarship	1
18.	Andaman Nicobar Island Scholarship	2
19.	TNAU Merit Scholarship - PG	2
	Total	279

Students' Hostel

Dr. M. Balasubramanian, Professor & Head, Department of Farm Machinery continued as Warden. He was assisted by two Deputy Wardens. Student office bearers were also elected to help in the efficient functioning of the hostel. Regular meetings of the mess representatives were held to discuss the points for smooth management of the messes.

FOREST COLLEGE AND RESEARCH INSTITUTE, METTUPALAYAM

Prof. G. Kumaravelu continued as Dean (Forestry) during the period under report. The college offered B. Sc. (Forestry), M. Sc. (Forestry) and Ph. D. (Forestry) degree programmes.

Admission

The number of students on roll in I, II, III and IV year B.Sc. (Forestry) was as follows :

Class	Boys	Girls	Total
I B. Sc. (Forestry)	16	—	16
II B. Sc. (Forestry)	21	1	22
III B. Sc. (Forestry)	11	1	12
IV B. Sc. (Forestry)	16	1	17

Educational Tour

Students of I B. Sc. (Forestry) were on educational tour from 3.1.92 to 8.1.92. They visited Siruvani, Top Slip, Coonoor, Ooty, Gudalore, Mudhumalai, Kothagiri and Kodanad.

Nineteen final B.Sc. (Forestry) students were on tour from 21.1.92 to 28.1.92 for a period of one week. Model nursery and forest types at Yercaud, clonal orchard and avenue planting at Neyveli, Mangrove forests at Pitchavaram and forest types and silvicultural systems at Kodaikanal were some of the important educational spots visited by them.

Forest Stay Programme

Final year B.Sc. (Forestry) students numbering 17 were on forest stay programme for one month from 26.2.92 to 27.3.92. The students were placed in Bolampatti range, Top Slip range and Mettupalayam range at the rate of six students in each range. During this programme, the students learnt about the forest types, wild life, forest operations, timber sales, tribal settlement, fire protection measures etc.

AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE, MADURAI

Dr. S. Sankaran was the Dean during the period under report. There are 14 departments, ten under the Faculty of Agriculture and four under Faculty of Basic Sciences and Humanities. The College offered B.Sc. (Ag) and B. Sc. (HSc) degree programmes besides postgraduate programmes leading to MSc. and Ph. D. degrees in different disciplines in Agriculture and Food Science and Nutrition.

Admission

The number of students on roll was as follows :

	Boys	Girls	Total
I B.Sc. (Ag.)	71	26	97
II B.Sc. (Ag.)	68	52	120
III B.Sc. (Ag.)	17	54	71
IV B.Sc. (Ag.)	29	56	85
I B.Sc. (HSc)	1	17	18
II B.Sc. (HSc)	3	10	13
III B.Sc. (HSc)	—	8	8
I M.Sc. (Ag.)	52	36	88
II M.Sc. (Ag.)	30	30	60
Ph.D	37	5	42
Ph.D (FS & N)	--	3	3
Total :	308	297	605

Educational Tour

One hundred and twenty five B. Sc. (Ag.) second year students were taken on educational tour to Regional Research Station, Kovilpatti; Agricultural College and Research institute, Killikulam; Rice Research Station, Ambasamudram; Cotton Research Station, Srivilliputhur and Horticultural Research Station, Periyakulam and also to Vaigai Dam from 21.1.1992 to 8.2.92 in two batches.

Seventy three B.Sc. (Ag) third year students were taken on an educational tour to Vedasandur, Mettupalayam, Bhavanisagar, Sirumugai, Trichy, Thanjavur, Aduthurai, Veppankulam, Vamban and Tamil Nadu Agricultural University, Coimbatore and also Sugarcane Breeding Institute, Coimbatore from 8.12.91 to 22.12.91.

Ninety three final year B.Sc. (Ag.) students took part in the *All India* study tour between 15.6.91 and 2.1.92. The students visited national and international institutions in New Delhi, Hyderabad, Hissar, Dehradun and other important cities.

Village Stay Programme

This programme was organised in 7 villages for a period of 30 days from 21.11.91 to 20.12.91. During their stay, the students organised and conducted method demonstrations on latest aspects of farm technologies. They also organised village meetings and mini exhibitions.

Scholarships

S. No.	Name of Scholarships/fellowships	UG	PG	Total
1.	Adidravidar Welfare Scholarship and	33	2	35
	Adidravidar Welfare Loan Scholarship	27	2	29
2.	Backward Classes Welfare Scholarship	100	4	104
3.	ICAR Junior Fellowship	—	16	16
4.	ICAR Senior Fellowship	—	3	3
5.	DNT Scholarship	5	—	5
6.	Madras Fertilizers Ltd., Fellowship	—	1	1
7.	Godrej soap Ltd., Fellowship	—	1	1
8.	Minor tuber crops	—	1	1
9.	Arunachalam Shastiabthapoorthy Scholarship	1	—	1
10.	Farmers Committee Fund Scholarship	1	—	1
11.	S. J. Jindal Trust Scholarship	1	—	1
12.	Pondicherry State Scholarship	—	2	2
13.	National Merit Scholarship	16	—	16
14.	Agri. Merit Scholarship	32	12	44
15.	Adhoc merit grant	6	—	6
16.	Bright Students Award	1	—	1
17.	Merit cum means Award	—	1	1
18.	National Loan Scholarship	1	—	1
19.	Prize money (SC/ST)	3	3	6
20.	Anna Memorial Award (Prize amount)	3	—	3
21.	M/s. Stanes and Company Fellowship	—	1	1
22.	Teachers Welfare Scholarship	1	—	1
23.	Aspee Fellowship	—	6	6

Students' Hostel

There were five hostels functioning in this campus to accommodate the students. During 1991 - 92, 228 boys and 246 girl students were accommodated in the hostels. The hostel was administered by the Dean. He was assisted by a warden, four deputy wardens and one resident tutor besides administrative personnel.

Students' Club

The students' club activities were inaugurated on 28.8.81 by Dr. S. Sankaran, Dean, AC & RI, Madurai. Dr. S. Jayaraj, Vice-Chancellor delivered the inaugural address. The students participated in a number of literary and cultural events and competitions and proved their talents in arts, photography, orational elegance, light music, etc.

Sports and Games

Twentysixth Annual Sports meet was conducted on July 9, 1991. Inter-collegiate Deans Trophy Hockey Tournament was conducted during August 1991. Dr. S. Jayaraj, Vice-Chancellor distributed the prizes. College cricket, tennis, foot ball and volley ball teams participated in a number of tournaments and friendly matches. Inter-class matches in various games were conducted for boys and girls.

National Cadet Corps

Forty cadets belonging to different undergraduate classes were enrolled during this period. Training in foot drill, weapon handling, field craft, map reading and first aid was imparted to the cadets. Five cadets attended the combined annual training held at Pasumalai from 21.12.91 to 1.1.92. Three cadets of final B.Sc. (Ag) class participated in army attachment camp at Secundrabad. The Republic Day parade was conducted on January 26, 1992. Dr. S Sankaran, Dean, hoisted the national flag and distributed the certificates to the NCC cadets.

National Service Scheme

There were 125 students on roll during the period under report. NSS volunteers actively participated in save tree compaign, adult education, tree planting, and campus cleaning programmes. They also participated in the Arivoli Iyakkam procession. A blood donation camp was organised at AC & RI., Madurai on February 12, 1992. Sitxy seven volunteers donated blood to save the needy.

AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE, KILLIKULAM

Dr. M. Rangarajan was the Dean during the period under report. The College offered B.Sc. (Ag) and M.Sc. (Ag) degree programmes under trimester system.

Admission

The number of students on roll during the year was as follows :

	Boys	Girls	Total
B.Sc. (Ag)	23	55	78

Educational Tour

Final B.Sc. (Ag) students visited ICRISAT at Patancheru, the Forest Research Institute, Dehradun, NARM at Hyderabad, Agricultural Universities at Hissar and Hyderabad; IARI and ICAR at New Delhi from 3.6.91 to 19.6.91. They were exposed to different agro-climatic, socio-economic and cultural conditions.

Third year B.Sc.(Ag) students visited Tobacco Research Station, Vedasanthur; TNAU Main Campus, Coimbatore; Agricultural Research Station, Bhavanisagar; Government Botanical Garden, Ootacamund; Forest Research Station, Mettupalayam and other research stations of the University at Paiyur, Cuddalore, Vridhachalam, Trichy, Pudukkottai and Vamban.

Village Stay Programme

Ninety nine final year students stayed with identified progressive farmers of southern districts of Tamil Nadu. During the programme, students learnt local cultivation practices and farmer's problems in agriculture. They were also in touch with functionaries of extension department and T & V contact farmers. They organised method demonstrations and participated in the fortnightly meetings of T & V programme along with the Agricultural Officers.

Scholarships

Sl. No.	Name of the Scholarship	No. of recipients
1.	Backward class scholarship	58
2.	Govt. of India - SC Scholarship	46
3.	Govt. of India - Loan Scholarship	31
4.	Pondicherry Post Matric Scholarship	9
5.	Bright Student Award	2
6.	National Merit Scholarship	9
7.	National Loan Scholarship	1
8	ICAR Post Matric Scholarship	1
9.	Gandhi Memorial Award	1
10.	Physically Handicapped Scholarship	1
11.	Ex-Servicemen Welfare Scholarship	3
12.	Andaman-Nicobar Island Scholarship	1
13.	Prize Money Award	2
14.	TNAU Merit Scholarship	6
15.	ICAR Junior Fellowship	4
16.	State/SC Scholarship	1
17.	Fellowship of Rastriya Chemicals	1
18.	ICAR Merit Cum Means Scholarship	3
		180

Students' Hostel

The Hostel was run under the Chairmanship of Chief Warden, assisted by Warden, three Deputy Wardens, One Assistant Warden and Six Residential Tutors. The messes were run on dividing system basis involving student representatives with committee to monitor the purchase of materials and preparation of menu etc. A full time medical officer and part time lady medical officer attended on the students and provided them medical care.

Students Club

Students club activities for 1991-92 were inaugurated on 19.9.91 by Dr. S. Jayaraj, Vice Chancellor. Two students participated in the quiz competition conducted by the Rotary Club on September 9, 1991 and won the second prize. Our students participated in quiz competition held at Nagarcoil on September 27, 1991 and won the Rolling Shield. Leo Club conducted free medical camp on November 11, 1991 as a step of "Village adoption scheme".

National Service Scheme

The National Service Scheme volunteers assisted in institutional development work like maintenance of lawns, roads, cleaning the surroundings of class rooms, etc. The students have also organised Arivoli Iyakkam, avenue planting and mass tree planting during November and December, 1991. Besides, regular night school for poor school children of Sivasubramaniapuram village was also conducted.

TAMILNADU GOVERNMENT AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE, KUMULUR

Dr. K. M. Ramanathan continued as the Dean during the period under report. The college offered B. Sc. (Ag) degree programme under trimester system.

The number of students on roll during the year was as follows:

Admission

Year	No. of students (Boys)
I B.Sc. (Ag)	19
II B.Sc. (Ag)	41
III B.Sc. (Ag)	51

Scholarships

Sl. No.	Name of the scholarship	No. of recipients
1.	B. C. Scholarship	32
2.	S. C. Scholarship	15
3.	TNAU merit Scholarship	4
4.	National loan Scholarship	1
5.	National Merit Scholarship	1
6.	SC Loan Scholarship	3

Students' Hostel

In all 99 students have been accommodated in the hostel. The hostel was run under the chairmanship of the Dean. The messes were run on dividing system actively involving student representatives for the purchase of materials and preparation of menu, etc. A part time medical officer attended on the students and provided them medical service.

National Service Scheme

The NSS has a strength of 75 volunteers on roll. The volunteers organised a mass tree planting programme. They actively participated in various activities with regard to World Food Day and Silver Jubilee Celebration of All India Radio-Farm Broadcast.

HORTICULTURAL COLLEGE AND RESEARCH INSTITUTE, PERIYAKULAM

Dr. R. Arumugam, continued as Dean during the period under report. The *college offered B.Sc. (Hort) degree programme under trimester system.*

Admission

Fifty three students, comprising of 29 boys and 24 girls were admitted in B.Sc. (Hort) programme during the academic year 1991 - 92. The number of students on roll in I and II year B. Sc. (Hort) is as follows:

Class	Boys	Girls	Total
I B. Sc. (Hort)	29	24	53
II B. Sc. (Hort)	33	20	53

Students' Hostel

Students were accommodated in the students' hostels at the campus. The hostel was run by the Dean who was assisted by two deputy wardens and one assistant warden. A part time medical officer was attending to the medical needs of the students.

Students' Club

The students club activities for the year 1991-92 were inaugurated by Vice-Chancellor Dr. S. Jayaraj on June 19, 1991. The students participated in a number of literary events and competitions and showed their talents. The annual club day was celebrated on November 25, 1991.

Sports and Games

This newly established college has been provided with necessary sports materials and other accessories. The college sports day was conducted on November 20, 1991.

POST GRADUATE EDUCATION

Dr. M. Gopalan continued as Dean (PGS). Masters and Ph. D. degree programmes were offered in 23 disciplines in Agriculture, Horticulture, Agricultural Engineering, Forestry and Food Science and Nutrition. In addition, Post-Graduate Diploma in Sericulture was also offered during the year. New M. Sc. Programme in Sericulture was also offered during the year. New M. Sc. programme in Sericulture was started during the year 1991-92 with a strength of 10 students.

Admission

During the academic year 1991-92, 294 students were admitted for various Masters degree programmes in Agriculture, Horticulture, Agricultural Engineering, Forestry and Food Science and Nutrition.

Details regarding the number of students admitted and passed out from various post-graduate programmes of the University during 1991-92 are furnished below.

a) **M. Sc. degree programme**

S. No.	Discipline	Coimbatore Boys	Coimbatore Girls	Madurai Boys	Madurai Girls	Killikulam Boys	Killikulam Girls	Total	No. of students passed out
1.	Agronomy	8	5	10	4	6	1	34	19
2.	Plant Breeding & Genetics	2	13	5	5	3	2	30	17
3.	Soil Science & Agrl. Chemistry	5	5	4	6	3	2	25	11
4.	Agrl. Entomology	5	5	3	2	3	2	20	13
5.	Plant Pathology	8	2	5	—	—	—	15	14
6.	Agrl. Economics	3	3	2	2	3	1	14	12
7.	Agrl. Extension	7	1	4	6	3	1	22	17
8.	Agrl. Marketing Management	2	4	—	—	—	—	6	5
9.	Agrl. Microbiology	4	6	5	—	—	—	15	7
10.	Seed Technology	5	6	—	—	—	—	11	9
11.	Plant Nematology	3	—	—	—	—	—	3	—
12.	Plant Protection	—	—	—	—	—	—	—	2
13.	Crop Physiology	—	—	2	1	—	—	3	4
14.	Sugarcane Prodn.	8	—	—	—	—		8	2
15.	Horticulture	7	8	—	—	—	—	15	13
16.	Forestry	5	—	—	—	—	—	5	4
17.	Bio-Technology	2	6	—	—	—	—	8	11
18.	Env. Science	1	4	—	—	—	—	5	3
19.	M. B. M.	12	—	—	—	—	—	12	5
20.	Post Harvest Tech.	3	1	—	—	—	—	4	4
21.	Soil & Water Conservation	2	2	—	—	—	—	4	-
22.	Agro Energy & Power	—	—	—	—	-	—	—	3
23.	Water Management	4	1	—	—	-	—	5	-
24.	Food Science	—	—	2	8	—	—	10	2
25.	Sericulture	9	1	—	—	—	—	10	—
26.	Farm Power & Machinery	-	—	—	—	—	—	—	2
27.	Dip. in Sericulture	5	5	—	—	—	—	10	—
	Total	110	78	42	34	21	9	294	179

b) **Ph.D. Degree Programme**

S. No.	Subject	Coimbatore P.T.	Coimbatore F.T.	Madurai P.T.	Madurai F.T.	Total	No. of students passed out
1.	Agronomy	51	7	6	—	64	13
2.	Plant Breeding & Genetics	32	2	5	2	41	9
3.	Agrl. Entomology	34	2	5	1	42	7
4.	Plant Pathology	29	5	2	2	38	5
5.	Soil Science & Agrl. Chemistry	16	6	3	2	27	8
6.	Agrl. Economics	22	3	—	—	25	7
7.	Agrl. Extension	10	2	—	—	12	10
8.	Seed Technology	18	1	—	—	19	1
9.	Agrl. Microbiology	12	2	—	—	14	1
10.	Crop Physiology	4	1	—	—	5	3
11.	Bio-Technology	8	3	—	—	11	—
12.	Plant Nematology	3	3	—	—	6	—
13	Environmental Science	9	—	—	—	9	—
14.	Forestry	5	4	—	—	9	—
15.	Horticulture	22	2	—	—	24	2
16.	Food Science & Nutrition	—	—	3	—	3	—
17.	Soil and Water Conservation	11	—	—	—	11	—
18.	Farm Power & Machinery	6	—	—	—	6	—
19.	Post Harvest Technology	6	—	—	—	6	-
20.	Bio-Energy	4	—	—	—	4	—
		302	43	24	7	376	66

PT : Part Time; FT : Full Time

Scholarships and Fellowships

The following scholarships, fellowships and stipends have been awarded to post-graduate students of various disciplines during 1991-92.

S.No.	Particulars	Senior	Junior	Total
1.	I. C. A. R.	–	83	83
2.	Bio-technology studentship	—	8	8
3.	Rastriya chemicals	—	1	1
4.	TNAU Merit Scholarship	8	42	50
5.	Tuticorin Alkali chemicals	—	1	1
6.	Gharda Chemicals Ltd., Bombay	—	1	1
7.	Potash Research Institute	—	1	1
8.	Agrl. Chem. & Pharma., Madras	—	1	1
9.	Dr. P. R. Metha Scholarship	—	1	1
10.	MFL Scholarship	—	1	1
11.	Aspee Fellowship	—	12	12
12.	Jindal Trust	—	1	1
13.	Stanes & Company	—	1	1
14.	Coramandel Indag	—	1	1

University Library

The Tamil Nadu Agricultural University holds an outstanding collection of books, antiquity and new scientific periodicals, rare and mostvaluable materials which prove to be a reservoir of knowledge to all students, research scholars and scientists. The literary collections of the library include all Agricultural and allied subjects like Agricultural Engineering, Biotechnology, Bio-energy, Horticulture, Forestry, Plant Pathology, Nematology, Entomology, Microbiology, Crop Physiology, Biochemistry and Genetics The library also possesses Annual Reports, Research Papers, Leaflets, Pamphlets etc. It is housed in a well equiped modern building.

The library is kept open for reference from 8.00 A.M. to 6.00 P.M. on all working days and 8.00 A.M. to 2.00 P.M. on Saturdays and Sundays excluding public holidays, The reading community receives the required reference assistance from the Library staff. The interlibrary loan and resources sharing facility is also available based on reciprocal basis. During the year under report, 753 books have been added to the collection. The present strength is 1,35,414. The additions included 120 gratis books, 157 theses and 31 advances and annual reviews. The Library purchased 50 books during the year.

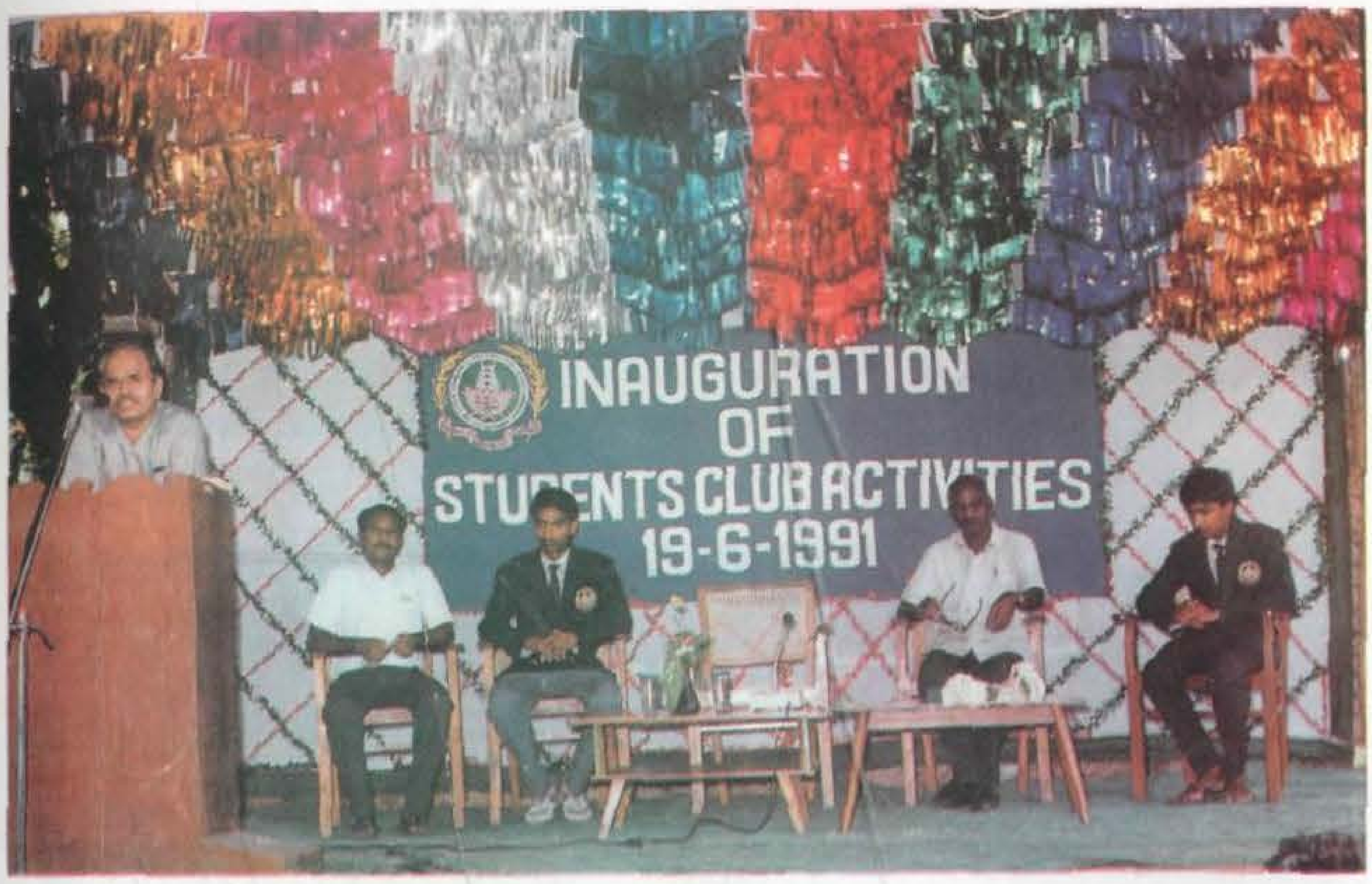
In tne academic year 1991-92 the Tamil Nadu Agricultural University library received 4852 single issues of periodicals. After processing, these periodicals were displayed in the respective subject areas. The Library subscribed for 686 periodicals of which 406 were foreign journals and 280 periodicals were Indian origin. One hundred and twenty four journals were received as gratis and 24 on exchange basis.

Under technical processing work, 448 documents were classified, catalogued and arranged according to classified order in the respective racks. These books were facilitated with Shelf register cards, Author cards, Subject cards, Book cards and Tracing cards for easy location of reading materials. Paper clippings 583 in number were collected from leading dailies on agriculture and allied subjects and filed in the respective subject files.

The library was utilised by 48,103 staff, scientists, and students. They referred to 4,41,955 documents. In the counter 35,596 books were charged. Under long and short range service 5,874 readers were helped in locating the relevant documents.

The library committee meetings were convened three times and the committee charted out several plans for the development of the library. The students library was utilised by 3,796 students. They referred 74,426 books. In the counter 2,731 books were issued on loan and 3,050 books were discharged after consultation. Under documentation and information services, the library has provided xerox copies of 617 content pages of current periodicals and 246 articles to constituent colleges.

For the benefit of the Under-Graduate students in Tamil Nadu Government Agricultural College and Research Institute, Kumulur and Horticulture College and Research Institute, Periyakulam text books have been transferred from Tamil Nadu Agricultural University library.



Inauguration of students club activities. HC & RI, Periyakulam

Sports day at AC & RI, Madurai

Growing Azolla - Onfarm demonstration by students

Village Stay Programme - Skill demonstration by final B.Sc. (Ag.) students.
AC & RI, Madurai

4. RESEARCH

The major research achievements of the University in the areas of crop improvement, horticulture, agricultural engineering, water technology and agricultural and rural development studies are presented in this chapter.

AGRICULTURE

RICE

Crop Improvement

Variety Released

TKM. 10 : It is a high yielding medium duration variety suited for semidry cultivation of Chengalpattu-MGR District. It is a semitall nonlodging rice with medium slender white grain. It is tolerant to early drought and moderately resistant to gall midge, green leaf hopper, leaf folder, brown spot and sheath rot. It has a duration of 95 - 100 days with a yield potential of 2600 kg/ha.

Promising cultures

TNAU 88013(IR 50/TNAU 80058) : This culture matures in 100 days and has yield potential of 5.8 t/ha. It has moderate resistance to blast. It is being evaluated in ART during 1992 - 93.

TM 6012 : It is a short duration (115 d) drought tolerant rice culture with an average yield of 2800 kg/ha under rainfed conditions in Chengalpattu - MGR district. It possesses short, fine white rice with very good cooking quality. This culture has been advanced for on-farm testing during 1992 - 93.

TCM 44 (MS 210) : It is a hybrid derivative of the cross between IR 64 x IET 9816. It matures in 110 - 115 days. It has high yield potential of 5.5 - 7.5 t/ha. It is being evaluated in ART.

TCM 60 : This is a hybrid derivative of the cross between Co 39 x TNAU 15776. It matures in 115 days and has medium tall plant stature. Its yield ranges from 5.5 to 6.0 t/ha.

IET 9976 : This is a cross derivative of the cross Phalguna x TKM 6 with a duration of 115 - 120 days. It has long slender white grain. It possesses field resistance to BPH, leaf folder, and blast. It is under further evaluation.

Hybrid rice : One early maturing hybrid TNRH 1 (IR 62 8294 x IR 10198 - 66 - 2R) was found to be superior to the adapted check varieties IR 50 and ADT 36 in the MLT conducted in the research stations of TNAU during Kharif 1991. The hybrid TNRH 1 recorded a mean grain yield of 5716 kg/ha as against 4365 and 5015 kg/ha recorded by IR 50 and ADT 36.

Crap Management

Field experiments conducted at Coimbatore during 1991 showed that pre - emergence application of anilofos at 0.3 kg/ha + 2, 4 - DEE at 0.4 kg/ha as ready mix gave broad spectrum weed control with least residue hazards and recorded high net return of Rs 11890/ha with B-C ratio of 2.65. This ready mix was found to be more economical than other herbicide mixtures and there is no residue problem.

Studies on rice with N^{15} enriched nitrogenous fertilizers have consistently shown that nitrogen applied basally is poorly utilized in all soils. It was found that basal application of nitrogen to rice crop could be reduced from the present level of 50% to 25% and the balance applied in three equal splits at 10 day interval between 15 and 45 days after transplanting for short and medium duration rice varieties.

Following a survey in the salt affected areas, four *Azospirillum* cultures viz., AZ. HS. 3, 16, 18 and 20 with high degree of salt tolerance were isolated. Studies have shown that these strains enhanced root growth, plant height and plant biomass. These salt tolerant strains of Azospirillum can be recommended for rice crop in the coastal areas of Southern districts.

The results of rice based cropping systems under Lower Bhavani Project area *revealed that irrigating rice 7 cm one day after disappearance of ponded water and* at 0.3 IW/CPE ratio for the succeeding groundnut realised the highest net income of Rs. 18,696/ha consuming 223.8 cm of water with the benefit of Rs. 8.6 per mm. of water used. Under constraints of irrigation, sesamum can be grown as a profitable crop in the sequence.

Continuous application of zinc, copper and iron did not increase their contents to toxic level and the crop also did not show any toxicity or deficiency symptoms at Bhavanisagar.

In Periyar-Vaigai command area integrated farming system comprising of crops, poultry, fisheries and vegetable cultivation was compared with the existing systems (rice-fallow and rice-blackgram). During the year 1989-90 piggery unit was included and subsequently during 1990-91 it was deleted. The results revealed that the net profit under rice-fallow system ranged from Rs. 9100 to 9300 per ha and under rice-blackgram system the net profit was from Rs. 10100 to 10760 per ha. The net profit under integrated farming system was Rs. 24960 to 22690

per ha respectively during 1989-90 and 1990-91. The employment opportunity in integrated farming system was enhanced to the tune of 63-68% in mandays and 57-60% in woman days over pure cropping system (rice-blackgram).

The addition of phosphorus sources such as potassium dihydrogen orthophosphate at 25 and 50 ppm has increased the megasporocarp germination and fertilization of Azolla.

Application of pendimethalin as pre-emergence at 1.25 kg a. i/ha on 7th day and 2, 4 D Na salt as post-emergence at 1.25 kg a.i/ha on 7th day and 2, 4 D Na salt as post emergence at 1.00 kg a.i/ha on 15th day was found economical in controlling the weeds in semidry rice at Madurai.

Studies conducted at Madurai indicated that *Sesbania rostrata* could be interplanted with kharif rice in 1:10 proportion with an intra row spacing of 15 cm and ratooning at 45 DAP. The fertilizer N application to rabi rice could be done at 75 kg N/ha resulting in a saving of 25 kg N/ha.

Green manure or green leaf manure when applied at the rate of 6.25 t/ha to rice soil and ploughed before transplanting, has been found to reduce the loss of N by about 13 kg/ha which otherwise would have been lost through volatilisation and leaching as was observed in rice soil not applied with green manure or green leaf manure at Aduthurai.

At Aduthurai, urea mixed with gypsum and neem cake in the ratio of 5:4:1 and applied to rice soil, reduced the loss of nitrogen by about 8 kg than urea applied alone.

At Aduthurai Phosphobacterial inoculation with 75% of the recommended 'P' (ie. 37.5 kg P_2O_5/ha) recorded a grain yield of 6666 kg/ha compared to 6222 kg/ha with 75% 'P' alone. Inoculated plots recorded a phosphobacterial population of 13 x 10^{5} g wet weight of soil against 4.5 x 10^{5} g in uninoculated plot.

Studies conducted at Madurai indicated that medium variety like white ponni and short duration variety Co 37 could be recommended for ratooning under broadcast wet seeded condition. The growth regulator GA spray (25 ppm) on 10 DAH of main crop with 125 kg N ha^{-1} could also be advocated irrespective of the variety.

At Ambasamudram, application of 50 kg K_2O/ha in 2 splits as basal and at panicle initiation stage was found to be economical. 75 kg K_2O/ha for kar and 90 kg K_2O/ha for Pishanam were the critical levels for potassium for Thamirabarani tract.

At Tirur, application of Farm Yard Manure @ 10 t/ha to rainfed rice has given the maximum grain yield of 1236 kg/ha followed by the application of pressmud @ 5 t/ha (1183 kg) and decomposed coirwaste @ 10 t/ha (1178 kg ha).

At *Killikulam*, pre-emergence application of pendimethalin at 1.25 kg/ha with one hand weeding recorded highest grain yield (6213 kg/ha). The unweeded check recorded the minimum grain yield (4153 kg/ha).

Nutrient deficiencies especially that of nitrogen exhibited by rice var IR 20 at 45 and 60 days after transplanting could be identified using remote sensing methods. The spectral reflectance at these periods showed distinct differences in N stressed and non-stressed plants.

Pyrazosulfuron-ethyl, a new herbicide is very effective for controlling all sedges and broad leaved weeds compared to the existing herbicides viz., butachlor, thiobencarb etc. In combination with butachlor or thiobencarb (0.625 kg), this new herbicide (0.02 kg)[*] recorded excellent control of all grasses, sedges and broad leaved weeds and gave high rice grain yield in wet seeded rice.

Crop Protection

The IPM practices to be adopted in rice have been identified as follows :

1. Seed treatment with carbendazim
2. Nursery application of carbofuran at 1.4 kg/8 cents at 15 DAS
3. Split application of N at 50% basal, neem coated urea 25% at tillering and 25% at panicle initiation stage.
4. Need based application of fungicides
5. ETL based application of insecticides
6. Use of Neem seed kernel extract 5% instead of insecticides
7. Rodent management using bromodilone

All the above 7 IPM practices have to be followed to maximise the yield. Non-adoption of any one practice will result in reduction in yield and the quantum of reduction will vary from place to place.

Need based application of phosphamidon @ 300 ml/ha on 30 DAT against stem borer and 5 rounds of sprays with monocrotophos 1000 ml/ha on 44, 51, 58, 65 and 72 DAT was on par with release of *T. japonium* on 30 DAT and 37 DAT (@ 50000 parasitised eggs/ha) and *T. chilonis* on 37, 44 and 51 DAT followed by three sprays with monocrotophos 1000 ml/ha on 58, 65 and 72 DAT in reducing the damage of above pests recording high yield with a cost benefit ratio of 1.0:2.92 and 1.79 respectively.

In another field experiment with "White Ponni", release of *T. chilonis* parasitoid six times at weekly intervals from 30 DAT reduced the leaf folder damage and increased the yield significantly (5819 kg/ha) over untreated control (5236 kg/ha).

Residue problem with HCH dust for the control of earhead bug was studied. The HCH residue analysis revealed that by dusting twice, the maximum residue limit 0.1 ppm was detected. Hence limiting the dusting operation @ 25 kg/ha once was attempted and the pesticide residue analysis was taken up. The results revealed that a total of 0.0693 ppm of HCH in grain at the time of harvest, 0.0222 ppm of HCH in polished grain and 0.0484 ppm of HCH in bran were detected. They were all well below the suggested tolerance limit of 0.1 ppm. Therefore one dusting of HCH @ 25 kg/ha at 50% flower initiation is recommended for the safe use of the pesticide.

At Aduthurai, on-farm trials conducted during 1990 - 91 with selected botanicals revealed the effectiveness of NSKE 5% either alone or in combination with monocrotophos 100 ml/ha in reducing the sheath rot intensity and in increasing the grain yield.

Trials conducted at Ambasamudram revealed that IBP 500 ml / ha, edifenphos 500 ml / ha, carbendazim 250 g / ha and ammonium molybdate 0.001% were on par and effective in the control of rice sheath blight.

On-farm trials were conducted during kuruvai (var. ADT 36) and Samba (var. ADT 38) at Aduthural to test the efficacy of neem products in the management of sheath blight of rice. The results showed that nursery application of neem cake @ 150 kg / ha followed by foliar spray with neem oil at 3% starting from initial disease appearance significantly reduced the sheath blight intensity in both the trials as against maximum in control.

Efforts were made for the forecasting of rice blast. The blast intensity and weather parameters recorded periodically since 1990 were analysed. The results showed that there was a positive correlation between the amount of dew and blast intensity. A regression equation was arrived at as follows.

$Y = 26.08 + 0.7x$ where

Y is blast intensity and x is amount of dew

MILLETS

SORGHUM

Crop Improvement

Promising Cultures

SPV 881 (TNS 30 x Co 26) : Matures in 105 days. Promoted to ART for testing under rainfed conditions during June-July and September-October sowings. In MLT it has given 30% increased grain yield over Co 26. It was found to perform extremely well in southern districts of the State.

TNS 31-1 and TNS 47 : These two promising cultures are being evaluated in ART in summer irrigated conditions. These cultures have recorded on an average 28.0 per cent increased yield over the high yielding check Co 25.

TNS 39 : It is a red grain culture (Sencholam) maturing in 90 days. It is being tested in on-farm trials in Salem District.

VS 47 : It is a highly promising thalaivirichan sorghum. In on-farm trials it gave an increased yield of 27 per cent over Co 19 and 20 per cent over Paiyur 1 This culture is shorter by 10 days in duration. It is being evaluated again for confirmation.

ICSV 202 and ICSV 239 : These two cultures gave an average increase of 22.0 and 18.0 per cent respectively over Co 26 in respect of grain yield.

SSV 119 : It is a sweet sorghum type. It has high juice recovery, brix value and sucrose percentage. It recorded the highest juice yield of 11496 lit / ha with a green cane yield of 37 t/ha. The brix value was 18.4 and the sucrose content was 13.0%.

Crop Management

At Aruppukottai, 40 kg N + 20 kg P_2O_5 as basal application along with the combined application of Azospirillum and phosphobacteria in both soil and seed treatment has given highest sorghum grain yield of 725 kg/ha as against 215 kg/ha in the control.

In sorghum (K 8) application of 50% of recommended P as DAP and 50% P as enriched FYM basally resulted in high grain and straw yield of 2870 and 5630 kg/ha respectively at Kovilpatti. This treatment was on par with recommended dose of full P in the form of enriched FYM (2824 and 5285 kg/ha of grain and straw yield respectively). The above two treatments recorded significantly higher yields than more application of P fertilisers without enrichment.

In sweet sorghum types, application N at 80 kg/ha with P_2O_5 at 60 kg/ha recorded higher grain yield (4.4 t/ha) and juice yield (19.58 t/ha) and significantly improved the juice extraction% (59.82%), sucrose% (13.67%) and syrup recovery% (24.23%) over the application of N and P at 120:60 kg/ha.

Experiments witn P^{32} have shown that use of enriched FYM fortified with recommended levels of P increased the grain yield of Co 26 sorghum (5100 kg/ha) and also improved the 'P' use efficiency.

Crop Protection

Use of Nuclear Polyhedrosis Virus in five sorghum varieties having different earhead patterns viz., CoH_2 (semi-compact), Co 4 (compact), Co 22 (Semi-com-

pact), Co 26 (semi-compact) and TNS 40 (Lax) revealed that two applications of NPV at 10 days interval at 250 LE/ha along with crude sugar 2.5 kg + cotton seed kernel powder 250 g on the earheads was as effective as endosulfan at 350 g a.i/ha in significantly reducing the larval population and increasing the grain yield, irrespective of the varieties tested.

Eventhough the cost benefit ratio of NPV is equal to that of endosulfan in view of increasing awareness of pesticides residue problems, the use of NPV can be recommended which has long term benefits like persistence and environmental safety.

At Madurai, nine plant products (leaf and flower extracts) were tested for their efficacy in increasing the seed germination, vigour index, and shoot and root length of sorghum seeds infested with different storage fungi. The results indicated that pretreatment with *Azadirachta indica* and *Catheranthus roseus* leaf extracts significantly increased the germination, vigour index and shoot length of infected seeds while *Lantana camera* leaf extract was effective in increasing root length. In the case of post inoculation treatment *Vitex negundo* and *Mentha arvensis* extracts were really effective in increasing germination, vigour index and shoot length. *A. indica* and *C. roseus* leaf extracts significantly inhibited the spore germination and mycelial growth of various seed borne mycoflora of sorghum.

CUMBU

Crop Improvement

Promising Cultures

ABH 219: This promising hybrid was tested throughout the state in comparison with X5, Co 7 and WCC 75. The results indicated the superiority of ABH 219 over the checks and hence it was proposed for evaluation during 92-93 also.

ICMS 8330 and ICMS 8332: The results of on-farm trials conducted indicated that these two cultures gave a mean of 28.4 and 26.3 per cent higher yield respectively than the high yielding check WCC 75 under irrigated condition. Under rainfed conditions they gave about 7.0 per cent higher grain yield than WCC 75.

Hybrid 1 BH 5539 (852 A x PT 1890): This hybrid was developed with a yield potential of 40 per cent increase over the check hybrid x 5 with downy mildew resistance and also tolerance to rust. This hybrid registered 3676 kg/ha of grain yield while the check x 5 gave only 2620 kg/ha. Seed production of this hybrid is in progress for large scale testing.

Early hybrids maturing in 75 - 80 days were also identified (IBA 5550, 5598, 5527 and 5534) with increased yield potential of 12 to 47 per cent over check x 5.

Crop Management

Under rainfed condition seed inoculation of phosphobacteria along with 40 kg N and 10 kg P_2O_5/ha recorded the highest grain yield of 615 kg/ha accounting for 41.0 per cent increase over the recommended level of N and P at 40 and 20 kg/ha. Thus there is a saving of 50% of P (10 kg/ha) by seed inoculation of phosphobacteria for rainfed pearl millet.

MAIZE

Crop Improvement

Promising Cultures

UMH 10 (UMI 90 x UMI 51) x (UMI 112 x UMI 130) : It is a double cross hybrid maize. In MLT, this hybrid recorded 20.8 per cent increased grain yield over the chek CoH 2 under irrigated condition and 15.5 per cent increased grain yield under rainfed conditions. It has been promoted for testing in ART during 1992 - 93.

Crop Management

Field experiments were conducted during rabi 1990 - 91 and Kharif 1991 at Coimbatore to identify the suitable herbicide for maize + soybean intercropping system. The study revealed that pre - emergence application of alachlor at 2.0 kg/ha recorded the high maize equivalent yield of 3739 and 4494 kg/ha during 1990 and 1991 respectively. Similarly net return was the highest with alachlor *at 2.0 kg (Rs. 8,974 with BC ratio of 2.35). Hence pre - emergence application of* alachlor at 2.0 kg/ha can be recommended for maize + soybean intercropping system for high returns with no residue problems.

In Co 1 maize, irrigation at 0.75 IW/CPE ratio recorded maximum seed yield. Furrow method with 175 kg N/ha recorded high seed yield and lowest fungal infection in seeds with good storability.

RAGI

Crop Improvement

Promising Cultures

TNAU 511 : It is a hybrid derivative of Indaf 1 x TNAU 303 with medium duration of 105 days. The mean yield is 4120 kg/ha which is 14 per cent more than the check Co 13. It is now under ART.

TNAU 332 : It is a cross derivative of Co 7 x TAH 60/6-4. This culture matures in 110 days. The average yield is 2735 kg/ha which is 16% increase over check Co 13.

Crop Management

The fertilizer recommendations for ragi grown in mixed black soils of Perianaickenpalayam series of Coimbatore district were worked out based on OFT.

The seed crop of Co 11 ragi should be fertilized with 90 : 45 : 17.5 kg NPK/ha along with 10 tons of FYM to realise high seed yield and quality.

Crop Protection

For the control of ragi blast under rainfed conditions, two sprays of edifenphos (0.1%), first at ear head emergence stage and the second at 10-13% flowering was found to be effective. This treatment resulted in lower incidence of blast (grade 4.6) and high grain yield (41.3%) over the unsprayed control.

SAMAI

Crop Improvement

Promising cultures

The cultures TNAU 141/2, IPM 1164, TNAU 5/79 were identified to be promising for grain yield and other attributes. These cultures are being evaluated in MLT.

Crop Management

Agro-techniques for maximising the grain yield for samai have been developed at Paiyur. They are : a) Compartmental bunding, b) seed hardening c) application of organic manures @ 12.5 t/ha, d) application of enriched FYM and e) application of bio-fertilizers and inorganic fertilizers.

MINOR MILLETS

VARAGU

Crop Improvement

Promising cultures

KMV 20 : This culture ranked first in All India Co-ordinated trials for the past three years. This culture will be proposed for release after confirmative trial for one more season.

SSRC 369 : This culture identified at SSRC, Trichy has been proposed for OFT.

TENAI

Crop Improvement

Promising Cultures

TNAU 43 and TNAU 53 : These two promising cultures have been promoted for evaluation under OFT during 1992-93.

TNAU 83, 87, 46 and 141 : These cultures were identified to be promising for grain yield. They are being evaluated in MLT.

PANIVARAGU

Crop Improvement

Promising Cultures

MS 1692 : This culture has been promoted for testing in OFT during 1992-93.

KUDIRAIVALI

Crop Improvement

Promising cultures

The culture TNAU 80 has been proposed for testing in OFT during 1992 - 93. Three cultures viz., MS 2470, TNAU 83 and TNAU 80 were identified to be high yielders. They are being evaluated under MLT.

PULSES

REDGRAM

Crop Improvement

Variety Released

VBN 1 : VR 1, a short duration redgram was released as VBN 1 redgram during January 1992. The duration of this variety is 95 - 100 days with an average yield of 850 kg/ha as pure crop and 400 kg as intercrop. Suitable for all seasons as intercrop to groundnut both under irrigated and rainfed conditions.

Promising Cultures

CoRG 9060 : A short duration hybrid derivative of cross Co 5 x ICPL 87. It is capable of yielding 950 kg/ha in 100 days duration. It is being tested in MLT during 92 - 93.

IPH 732 : It is a short duration indeterminate hybrid redgram promoted to ART during 1992 - 93. Large scale seed production has been taken up. This hybrid is capable of yielding 1400 kg/ha.

Crop Management

Response of pigeonpea to P and S with four levels of P viz., 0, 20, 40 and 60 kg/ha and three levels of sulphur viz., 0, 20, and 40 kg/ha as gypsum was studied at Coimbatore. Amount of sulphur present in the single superphosphate was also taken into account. The results revealed that seed yield increased with increasing levels of sulphur from 0 - 40 kg/ha. The comparitive economics indicated that application of 40 kg P and S as gypsum gave good net return of Rs. 4965/ha with B/C ratio of 2.4.

At Vamban application of 20 kg K_2O/ha as two splits viz. 1/2 as basal and 1/2 at flowering to rainfed short duration ICPL 87 redgram increases the yield by 30% over control in red - lateritic soils. The cost - benefit ratio was also high (1.80) for this treatment.

Treatment of 12.5 kg N + 37.5 kg P as Mussoriephos + Rhizobium + Phosphobacteria inoculation recorded maximum grain yield of 618 kg/ha in ICPL 87 short duration redgram.

Crop Protection

In redgram, seed treatment with carbendazim (2 g/kg of seed) plus seed treatment with *Trichoderma viride* recorded less wilt incidence of 18.5% as compared to seed treatment with carbendazim alone (30.1%) or seed treatment with *T. viride* (26.6%). Control recorded 53 8 per cent wilt incidence.

Spraying four rounds of NPV 250 LE/ha + B.t. at 1 kg/ha at weekly intervals recorded minimum pod borer and pod fly damage (16.9%) and also registered significantly higher yield of 998 kg/ha than other treatments.

BLACKGRAM

Crop Improvement

Promising cultures

VB 4 : It is a selection from PDU 5. This culture is resistant to yellow mosaic with a yield potential of 950 kg/ha.

CoBG : 282 This promising culture is a derivative of Co 2 x G 37. This entry is now in multilocation trial.

Crop Management

At Aduthurai, intra row intercropping of blackgram and soybean in rice fallow cotton with 60 - 30 - 30 kg NPK/ha with two foliar nutrition with DAP at flowering and ten days later was found to yield 13.8 q/ha of cotton kapas and 1294 kg/ha of blackgram grain in cotton + blackgram intercropping system and 13.43 q/ha of cotton kapas and 1282 kg/ha of soybean in cotton + soybean intercropping system.

Crop Protection

For the control of *M. incognita* on blackgram application of VAM, *G. fasciculatum* at 10 g/kg of soil reduced the nematode population and increased the shoot length by 61.6 per cent over nematode alone inoculated plants.

The studies conducted at Madurai on the effect of soil application of Trichoderma isolates on the incidence of root rot disease of blackgram revealed that after 4, 9, 15, 21 and 30 days of sowing, the application of *Trichoderma* isolates caused significant reduction in the disease incidence and their effect was comparable to that of carbendazim and *T. hamatum* treatments.

In blackgram, seed treatment with carbendazim (2 g/kg of seed) plus seed treatment with *Trichoderma viride* was found to show less root rot incidence of 8.7% as compared to seed treatment with carbendazim alone (17.3%) or seed treatment with *T. viride* (14.0%). Control recorded 29.8% root rot incidence.

GREENGRAM

Crop Improvement

Promising Cultures

Cultures viz., CD 1-47-4 and CoGB 2 are promising and are now being evaluated in ART. Another culture 39047 has recorded a mean yield of 1296 kg/ha which is 38% increased yield over the check Co 5. Culture NARP 1 recorded a mean of 1328 kg/ha which is 32% increased yield over Co 5. These two cultures are being evaluated in MLT.

Crop Protection

Among the three neem derivatives tested in three onfarm trials during 1990-92, neem seed kernel extract (5%) and neem oil (3%) as foliar spray twice at 10 days intervals starting from initial disease appearance significantly reduced the powdery mildew disease of greengram and blackgram when compared to untreated control.

Two field experiments were conducted one each on greengram and soybean to study the efficacy of neem oil and NSKE against galerucid beetle. The

results indicated the spraying of neem oil 3.0% or NSKE 5% was effective in controlling the galerucid beetle in greengram and soybean and was on par with spraying of monocrotophos @ 500 ml/ha.

SOYBEAN

Crop Improvement

Promising Cultures

UGM 52: It is a high yielding short duration culture. It is suitable for intercropping in sugarcane. It is being evaluated under MLT.

UGM 34: This culture is a high yielding indeterminate type. It is under ART.

Crop Management

To find out the effect of moisture stress on the yield of soybean and also to evaluate the different drought alleviating materials, an experiment was conducted at Madurai during 1989-91. Stress was imposed during four physiological growth stages ie., preflowering stage (11-30 DAS), peak flowering stage (31-50 DAS), pod development stage (51-70 DAS) and pod maturity stage (71-90 DAS). Application of drought alleviating materials ie. Kaolin 3% spray, liquid paraffin 1% spray and Jalasakthi as soil application at 10 kg/ha were taken up with a control.

The grain yield data revealed that peak flowering stage was the most critical stage for moisture stress as evidenced from the lowest grain yield (1982 kg/ha) followed by stress at pre-flowering stage (2242 kg/ha). Moisture stress during pod formation (2342 kg/ha) and pod maturity (2375 kg/ha) stages did not affect the yield markedly.

With regard to use of moisture stress alleviating materials, Kaolin at 3% foliar spray registered high yield of 2332 kg/ha and was on par with foliar spray of 1% liquid paraffin indicating that either Kaolin 3% or liquid paraffin at 1% as foliar spray may be used as stress alleviating measure during periods of water scarcity.

To study the response of soybean to sulphur nutrition experiments were conducted during rabi and kharif seasons of 89-90 and 1990-91 under irrigated conditions with variety Co 1. The results showed that in both years, seed yield of soybean increased with increasing levels of sulphur from 0-40 kg/ha in the form of gypsum. Application of sulphur at 40 kg/ha recorded high mean seed yield of 1533 kg/ha. The comparative economics indicated that application of sulphur at 40 kg/ha in addition to the recommended level ot NPK gave the high net return of Rs. 7189/ha with B-C ratio of 3.60.

Field trial conducted at Agricultural Research Station Aliyarnagar during kharif 90 in Co 1 variety of Soybean to study the effect of combined inoculation of *Rhizobium japonicum* and Phosphobacteria indicated that combined inoculation of *R. japonicum* strain 61A 6 plus phosphobacterium gave higher grain yield than individual inoculation and uninoculated control. The combined inoculation enhanced the yield to an extend of 17.6 per cent whereas individual inoculation of *R. japonicum* and phosphobacteria increased the yield by 10.0 and 1.3 per cent respectively over control.

Crop Protection

In the case of soybean, spraying of methyl demeton 500 ml/ha was found to be significantly better in controlling the beatle damage followed by neem oil 3.0% and neem seed kernel extract 5.0%.

COWPEA

Crop Improvement

Promising Cultures

VCP 5 : This culture has a duration of 65-70 days and recorded an average yield of 580 kg/ha in the ART for the past two years. It is under further evaluation.

VCP 7 : This promising culture has a yield potential of 900 kg/ha in MLT during 91-92. It has been promoted to ART for further testing.

Crop Management

Trials conducted at ARS, Aliyarnagar indicated that among the several rhizobial strains, inoculation with CoC 11 recorded maximum nodule dry weight and grain yield over the standard strain CMBS-1 and uninoculated controls. The rhizobial strain CoC 11 recorded the maximum grain yield of 1792 kg/ha when compared to 1572 kg/ha in CMBS-1 strain and 1283 kg/ha in uninoculated control, an increase of 40% over uninoculated control

Irrigating cowpea at 65 mm CPE (8-10 days) with 100 per cent N (25 kg/ha) + seed hardening with $ZnSO_4$ at 100 ppm recorded the highest mean yield of 800 kg/ha and net return of Rs. 3709 / ha with high BC ratio of 2.39.

Under limited water supply, irrigating the crop at 120 mm CPE (18-20 days) with 100% N + Seed hardening with $ZnSo_4$ gave higher yield and WUE than control.

Crop Protection

Field studies conducted at Madurai revealed that spray applications with neem oil 1%, prosopis 10% and Iluppai oil 1%, 25 and 45 days after sowing decreased the incidence of cowpea aphid borne mosaic virus disease and increased the yield.

The disease incidence was 7.91, 8.84 and 9.36 per cent respectively in neem oil, prosopis and Iluppai oil treatments as compared to 18.69 per cent in the control. The yield was 890, 815 and 830 kg/ha in the treated plots respectively as compared to 540 kg/ha in control.

BENGALGRAM

Crop Improvement

Promising cultures

Nine bold seeded bengalgram types superior to Co 3 have been identified under collaborative breeding programme with ICRISAT. They are: CoG 7, CoG 8, CoG 9, CoG 10, CoG 11, CoG 12, CoG 13, CoG 14 and CoG 15. These selections are in the duration range of 90-100 days with seed weight 25.3g/100 seeds. They are under further evaluation.

Crop Protection

Spraying endosulfan 0.07%, neem oil 0.1% and NSKE 5.0% were found to be superior in reducing the pod borer damage and increasing the yield significantly compared to control.

Field studies on chickpea showed that 5 sprays of *Bacillus thuringiensis* var kurstaki (Delfin) @ 2.5 kg/ha effectively reduced the pod damage and increased the yield of chickpea. *B. t.* was found to be as effective as NPV or endosulfan.

Results from a field trial showed that 3 releases of *Chryospora second instar* larvae @ one lakh/ha was as effective as NPV in reducing the pod damage and increasing the yield in bengalgram.

LAB-LAB

Crop Protection

In field bean (*Dolichos lab lab* var. lignosus) Heliothis NPV 125 LE / ha + teepol 0.1% + endosulfan 0.07% and NPV 125 LE / ha + teepol 0.1% + endosulfan 0.035% were effective in good control of pod borers with high grain yield.

OILSEEDS

GROUNDNUT

Crop Improvement

Promising Cultures

TNAU 97 : It is a short duration (90 days) bunch type with high yield. This culture will be evaluated in OFT in 40 centres during 1992 Kharif season.

VG 108: This culture is a derivative of *A. hypogaea x A. cardenasi*. It is a semi-spreading type maturing in 120-125 days, resistant to both rust and late leaf spot. It recorded a mean pod yield of 1458 kg/ha accounting for 13.2% higher than TMV 10. It has a shelling outturn of 69.0 per cent.

Crop Management

The results of the front line demonstrations in groundnut conducted at 10 locations revealed that there was a definite increase in yield upto 7 q/ha by adopting the improved package of practices with the variety VRI 2. The average yield in demonstration plots was 27.03 q/ha while local practice recorded only 20.37 q/ha. The additional cost involved for adopting the improved technology is only Rs. 1895/ha as against an additional income of Rs 7500/ha.

Intercropping in irrigated groundnut (VRI 2) with redgram (ICPL 87) in 4:1 ratio recorded a yield of 1496 kg/ha groundnut and 170 kg/ha redgram at Madurai. The net return per rupee invested was 2.25.

Field trials carried out at Coimbatore with Co 1 groundnut under irrigated conditions showed that foliar spray of Chamatkar (Mepiquat chloride-1, 1-dimethyl piperidinium chloride) at 125 ppm on 35 DAS was very effective in increasing pod and seed yield. The treatment gave a high pod yield of 2611 kg/ha accounting for 42.0 per cent increase over unsprayed control which gave only 1833 kg/ha. The kernels contained high protein (26.3%) and oil (52.7%)

Crop Protection

Studies on the groundnut leaf miner control with different insecticidal dusts at Tindivanum revealed that quinolphos 1.5% dust @ 25 kg/ha significantly controlled the leaf miner larvae compared to the other chemicals.

SESAMUM

Crop Improvement

Variety Released

SVPR 1 : The culture TSS 6, a white seeded variety developed by selection from the Western ghat types of Rajapalayam has been released as SVPR 1

during January, 1992. Its duration is 75 days. The average yield recorded by this variety is 1600 kg/ha which is 33% higher than the existing ruling variety TMV 4. The capsules are bold and campactly packed. The oil content is 52% as compared to 50% in TMV 4. It is tolerant to phyllody disease. This variety is suitable for raising during Summer (February-March) and Winter (November-December) seasons.

Promising Cultures

TNAU 12 : This culture is high yielding and it has been promoted to ART during 1992-93 cold and summer seasons.

VS 350 : It matures in 75 days. This culture was found to be promising during summer season in Cauvery Delta Zone. It recorded a mean yield of 799 kg/ha in 75 days whereas the check TMV 4 recorded 817 kg/ha. The per day productivity is high. This culture is being evaluated for its suitability under rice fallow conditions of Cauvery Delta Zone.

Crop Managemant

Integrated weed management studies for sesamum conducted during Kharif 1990 and 1991 at Coimbatore revealed that hand weeding twice and pre-emergence application of alachlor 1.0 kg/ha + one hand weeding and Metolachlor 1.0 kg/ha + one hand weeding on 25 DAS recorded high yield of 634, 609 and 598 kg/ha and were on par. The comparative economics showed that pre-emergence application of alachlor at 1.0 kg/ha + one hand weeding on 25 DAS recorded the highest B/C ratio of 2.71 followed by metolachlor 1.0 kg + one hand weeding on 25 DAS (1.67).

Crop Protection

At Madurai field experiments conducted showed that application of *Trichoderma hamatum* or *T. harzianum* grown on farm yard manure and applied basally @ 10 t/ha significantly reduced gingelly root rot disease caused by *Macrophomina phaseclina* by 82.0 and 81.0 per cent over control as compared to 88.0 per cent in carbendazim (0.05%) soil drenching done on the appearance of the disease.

Application of *T. hamatum* or *T. harzianum* also recorded high yield viz., 849.0 and 325.0 kg/ha as compared to 148.0 kg/ha in the untreated control. The sowing of the crop was done seven days after the application of the antagonists.

Several plant products were tried for their efficacy against sesamum shoot webber and pod borer during rabi 1990-91 and Kharif 1991. Among the plant products tested, neem oil 2% gave good control (84.0%) and it was next best to the standard treatment endosulfan 0.07% (88.7%). Thus two rounds of application of neem oil 2% one at vegetative stage followed by second spray

at flowering can be recommended for the control of shoot webber and pod borer of sesamum. Neem 2% spray recorded a yield of 945 kg/ha against 1072 kg/ha in endosulfan and 424 kg/ha in control.

SUNFLOWER

Crop Improvement

Promising Cultures

CIB 292 : This culture recorded a high yield of 1351 kg/ha which was 90.0 per cent more than that of check Co 2.

CIB 275 : This culture recorded 54.6 per cent more yield than the check Co 2.

Hybrids : Five hybrids viz., 85121 (1A x Armavik), 85131 (1A x Co 2), 85137 (2A x 131811), 85144 (2A x EC 68414) and 85151 (2A x Co 2) were found to perform better than the check MSFHS by recording 21.4, 30.0, 10.0, 32.0 and 29.0 per cent increased yield. They are being evaluated under MLT.

Crop Management

Combined application of Farmore (Cytogenetic growth regulator) through seed - foliar + soil at 2 ml/kg of seed + 125 ml/ha at 30th day as foliar spray and 1000 ml/ha as soil application increased the seed yield of sunflower by 7.2 per cent over the control at Bhavanisagar.

Experiments conducted at Bhavanisagar to study the stages of irrigation in sunflower hybrid BSH 1 revealed that irrigating the crop at vegetative, flowering, button initiation, seed filling and seed development stages consuming 600 mm of water recorded maximum seed yield of 1458 kg/ha. Button initiation and flowering stages were found to be the most critical ones.

CASTOR

Crop Improvement

Promising Cultures

TVC 11 (Aruna x HO) : It is an early maturing (135 days) high yielding castor. This culture recorded a mean yield of 1125 kg/ha accounting for 20.8% increased yield over TMV 5. It is being evaluated under ART.

TVC 15 (Aruna x TMV 1 - 28) : It is also an early duration (135 days) culture registering a mean yield of 1288 kg/ha which is 21.0% higher than TMV 5. This is now in MLT.

TVC 30 and TVC 31 : These two cultures are suitable for mixed cropping condition. They have a duration of 130 days with a yield potential of 1157 kg/ha and 1128 kg/ha respectively. These cultures were advanced to ART and AICORPO trials for testing both as pure crop and mixed crop.

Crop Management

Study on intercropping of castor as base crop at Tindivanam revealed that castor yield was the highest in castor intercropped with groundnut (720 kg/ha). The castor + groundnut combinations gave a good income of Rs. 5,500/ha.

The study of intercropping of castor in blackgram revealed that blackgrame + castor combination would be suitable in the case of late receipt of monsoon, when castor + groundnut combination is not possible. Six rows of blackgram with one row of castor combination gave a high income of Rs. 4650/ha compared to pure crop of blackgram (Rs. 3650/ ha) and castor (Rs. 2200/ha).

Crop Protection

Studies at Tindivanam on the effect of neem products on the management of castor pests revealed that neem seed kernel extract 3% with neem seed oil 2% (@ 2 ml/lit) significantly controlled semilooper larvae better than the chemicals and was found to be superior over control.

COCONUT

Crop Improvement

Promising Culture

Chandra Kalpa (Lakshad weep ordinary) : It is an elite cultivar of Lakshadweep ordinary and is endowed with high female flower production (450 nos. as against 380 in ECT). It has high setting (22% in LO against 15% in ECT), drought tolerance and capacity to tolerate rhinoceros beetle. This has registered 40% increased nut yields over ECT (130 LO, 70 in ECT) and is on a par with the yield potentials of T x D hybrids. This can be widely adopted for areas of stress environments since it has good adaptability.

Crop Management

For early detection of Thanjavur Wilt disease in coconut, the root samples were analysed through EDTA Test and the critical range of O. D. values for different categories of diseased palms were worked out and presented below :-

Disease intensity	Optical Density Values
Mild	0.18 — 0.23
Moderate	0.24 — 0.59
Severe	> 0.60
Healthy	0.02 — 0.10

The apparently healthy palms showed high O.D. values, 5-11 months prior to the onset of external symptoms, indicating its dependability for early diagnosis of Thanjavur Wilt. This test is useful also for detecting the disease in palms with wilt but without showing bleeding symptoms. This will give ample time for the coconut growers for the initiation of control measures. The test is quite simple and it will cost about 40 paise for testing one palm.

Experiments conducted at Veppankulam revealed that correction of barren-nut formation could be achieved after 3½ years of treatment, with extra 2 kg of Potash combined with 200 g of borax/palm over and above the usual dosage of fertilisers. The nut yield is increased by 4.5 fold compared to pre-treatment stage. The cost benefit ratio is 1.0 : 2.3.

Crop Protection

Root feeding of 2 ml of tridemorph in 100 ml of water to Thanjavur wilt ıffected palms was found to be equally effective as that of root feeding of aureo-unginsol 2 g with 1 g of copper sulphate in 100 ml of water + bordeaux mixture oil drenching.

Experiments for the control of the termite, *O. obosus* indicated the effec-iveness of spraying either aldrin 0.15% or HCH 0.25% or chlordane 0.1%, closely ɔllowed by neem oil 5% and neem seed kernel extract 20% once on the base and pto 2 m height of the trunk. These treatments gave cent per cent control of ɜrmite in coconut palms.

A combined treatment of root feeding of monocrotophos @ 5 ml + 5 ml ater, spraying of 0.01% monocrotophos followed by the release of parasitoids at very 15 day intervals of time was found to give effective control over the leaf-ıting caterpillar *Opisina arenosella.*

OTTON

·op Improvement

ıriety Released

ADT 1: It is a selection from the germplasm accession Tomcot 37 H. is variety is recommended for cultivation in the short rice fallows of Cauvery

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Crop Protection

Root feeding of 2 ml of tridemorph in 100 ml of water to Thanjavur wilt affected palms was found to be equally effective as that of root feeding of aureofunginsol 2 g with 1 g of copper sulphate in 100 ml of water + bordeaux mixture soil drenching.

Experiments for the control of the termite, *O. obosus* indicated the effectiveness of spraying either aldrin 0.15% or HCH 0.25% or chlordane 0.1% closely followed by neem oil 5% and neem seed kernel extract 20% once on the base and upto 2 m height of the trunk. These treatments gave cent per cent control of termite in coconut palms.

A combined treatment of root feeding of monocrotophos @ 5 ml + 5 ml water, spraying of 0.01% monocrotophos followed by the release of parasitoids at every 15 day intervals of time was found to give effective control over the leaf-eating caterpillar *Opisina arenosella.*

COTTON

Crop Improvement

Variety Released

ADT 1: It is a selection from the germplasm accession Tomcot 37 H. This variety is recommended for cultivation in the short rice fallows of Cauvery

Delta Zone. It matures in 120-125 days with an earliness of 10 days compared to MCU 7. It is a medium staple cotton with comparable fibre quality of MCU 7. It is moderately resistant to spotted boll worm. It has recorded an average kapas yield of 1263 kg/ha as against 1106 kg/ha in MCU 7.

Promising Cultures

TCH 1002 : It is a promising *G. hirsutum* culture which is being evaluated under ART along with check varieties MCU 5, MCU 7, LR 45166 and SVPR 1 during summer 1992.

TCH 7 (MCU 7×G 23) : This culture was identified as suitable for drought prone areas like Aruppukottai tract. It has consistently given higher kapas yield than MCU 10 and LRA 5166. The average increase in yield was 12% over LRA 5166 and 19% over MCU 10.

Crop Management

With a view to evaluate different cotton based intercropping systems for rainfed tract of Coimbatore and Paiyur for their economic viability, field experiments were conducted at Coimbatore and Regional Research Station, Paiyur with four intercropping systems viz., sole cotton (MCU 10) raised in uniform rows of 45x15 cm, cotton+greengram (Co. 3), cotton+cowpea (Co. 4) and cotton+blackgram (Co. 5) raised in paired row of 30/60 x 15 cm. One row of intercrop was raised in between paired row of cotton. Among the intercropping systems evaluated, cotton (MCU 10) intercropped with cowpea (Co 4) and greengram (Co. 4) recorded high net return of Rs. 769 and Rs. 654/ha respectively at Coimbatore. At Paiyur, cotton intercropped with greengram (Co 3) gave good net return of Rs. 4471/ha. For Paiyur region, cotton (MCU. 10)+greengram (Co. 4) is really profitable, whereas for Coimbatore region, cotton+cowpea (Co. 4) / greengram (Co. 3) is highly remunerative for profitable return.

With a view to identify suitable intercrops for advance sowing in winter cotton, an experiment was laid at Coimbatore during 1991-92. The intercrops viz., blackgram (Co. 3), soybean (Co. 1) and cowpea (C. 152) were raised at row spacing of 37.5 cm x 10 cm (2.66 lakh plants/ha) 20 days before cotton sowing (third week of July). Cotton MCU 11 was sown 20 days after sowing of intercrops at normal row pattern of 75 x 30 cm. The results revealed that the advance sowing of intercrops viz., greengram, cowpea and soybean reduced the cotton yield only by 1.4%, 5.2%, 7.7% and 9.6% over sole cotton. Among the intercrops, soybean recorded the highest seed yield of 867 kg/ha followed by greengram (660 kg/ha).

The comparative economics indicated that greengram+cotton system recorded highest net return of Rs. 15570/ha with B-C ratio of 2.83, followed by soybean+cotton system giving a net return of Rs. 14230/ha with B-C ratio of 2.67. Advance sowing of greengram (Co. 3) / soybean (Co. 1) 20 days before sowing of

cotton in 37.5 x 10 cm row pattern and sowing of cotton during third week of July in uniform row pattern (75 x 30 cm) increased the net return by Rs. 5360/ha and Rs. 4020/ha over sole crop of cotton.

Three years study of nutrient management for premonsoon sowing of cotton based intercropping system at Kovilpatti revealed the following. Application of 20 kg P_2O_5/ha as enriched farm yard manure at premonsoon sowing and 40 kg N/ha at first rains recorded high seed cotton yield (853 kg/ha), blackgram intercrop yield (315 kg/ha) and high net income (Rs. 5287 kg/ha).

In cotton (Var. MCU 10) the highest kapas yield of 722 kg/ha was recorded when the P is applied through enriched farm yard manure as basal. The enriched farm yard manure, prepared by polysack method was found to be superior to heap and pit methods of preparation of enriched farm yard manure. Hence polysack method can be recommended for adoption.

The results of on-farm trials conducted in Madurai and Kamarajar Districts with MCU 7 cotton revealed that spraying of Kaolin 3% twice during peak flowering and boll formation stages was very effective in controlling the transpiration rate under water stress conditions. This treatment gave 1429 kg/ha kapas yield as against 1326 kg/ha in control accounting for 7.8% increase over control.

Crop Protection

The cotton surface weevil is a serious pest on rainfed cotton in some parts of black cotton tracts of southern districts in Tamil Nadu. Eight on-farm trials were conducted during 1990 rabi (October - November) season. The results revealed that in all the individual trials seed treatment with 50 ml either aldrin or chlorpyriphos per kg of seed at the time sowing was statistically superior in controlling the surface weevil damage on plant basis and leaf basis. The cost of seed treatment will work out to Rs. 120 and Rs. 150 for aldrin and chlorpyriphos respectively.

A laboratory experiment was conducted to find out the effect of *Chrysopa* larvae on *Trichogramma* parasitized eggs when released simultaneously by providing parasitized eggs at different days after parasitization. The extent of predation was studied and it was found that the *Chrysopa* larvae preferred more on the parasitized eggs compared to unparasitized eggs. The *Trichogramma* parasitoids emerge from the released parasitized cards in about 2-3 days. Hence, it is advised to release *Chrysopa* larvae after a minimum period of 3 days after tagging *Trichogramma* cards.

Data from a field trial on cotton (LRA 5166) showed that 6 rounds of ULV spray of NPV with 10% cotton seed kernel extract, 10% crude sugar, 1% glycerol, 1% egg white and 0.1% each of Ranipal and Teepol gave effective control of *Heliothis* with the maximum cost-benefit ratio. Spraying should start at square formation stage when I & II instar larvae are seen.

The data from the experiment conducted at Coimbatore revealed that feeding by healthy *H. armigera* was higher on virosed cadavers of *Heliothis* than on healthy larvae which resulted in higher virus death. The finding of transmission of NPV from cadaver to healthy ones is of practical significance. When the virus is sprayed on cotton against a mixed population with different instars, the young larvae are killed in the same generation. The larvae that escape infection might feed an the dead cadavers from which they can get enough virus inoculam resulting in their death.

The toxicity of common insecticides used in cotton ecosystem was tested by directly exposing eggs and larvae of *Chrysopa* to the insecticides in two separate experiments. The toxicity was assessed by recording percentage of hatching of eggs and larval mortality at different days after treatment. The results indicated that high mortality of larvae was caused by Chlorpyriphos, quinalphos and fenvalerate at recommended doses. The pesticides dicofol, endosulfan, methyl demeton, monocrotophos and phsalone were comparatively safer to *Chrysopa* larvae. Egg mortality was very low in all the cases.

The protective apparel made out of cotton fabrics like gada or mull could afford protection to the spraymen. The protective apparel when treated by dipping in solution of 5 or 10% $NaHCO_3$ and dried before wearing could afford much more protection.

Studies on the evaluation of the efficacy of plant products in the management of cotton whitefly *Bemesia tabasi* at Aduthurai revealed that spraying with *Vinca rosea* extract 5% was significant in reducing the white fly population to about 43.3% at 24 hours after spray. This treatment was on par with neem oil @ 5 ml + Triazophos @ 2.5 ml/litre spray in reducing the white fly population by 46.7% and 59.9% respectively. At 72 hours after spray plant derivatives like neem oil, NSKE, notchi leaf extract and *Vinca rosea* extract were affective in reducing the white fly population.

SUGARCANE

Crop Improvement

Varieties released

CoC 92061 : It is a short duration variety. It comes to maturity at the age of eighth month and reaches the peak level of yield and quality at the age of 11 months. When it was compared with the popular early variety CoC 671 at the age of 10 months, it excelled CoC 671 in cane yield and juice quality by 15.4% and 6.7% respectively. It is moderately resistant to red rot. It is a non-lodging and non-flowering variety with thick cane suitable for entire Tamil Nadu.

Co 8362 : This variety is suitable for mid and late seasons. It is a high yielding and nonlodging variety maturing in twelve months. It gives 7.3 per cent higher cane yield with better juice quality and ratooning ability than Co 6304.

Promising cultures

C 87242 : It is suitable for early season. This clone recorded significantly higher cane yield of 144.06 t/ha as compared to checK CoC 85061 which recorded 121.04 t/ha. It is now evaluated in CAE trials.

C 87243 : It is suitable for mid/late seasons. This clone recorded significantly high cane yield of 123.4 t/ha as compared to the check Co 6304 which recorded only 110.0 t/ha.

Si 85036, Si 85057, Si 85124, Si 85022 and Si 85197 : These promising clones have been identified at Sugarcane Research Station, Sirugamani. They have been forwarded to 33 sugar factory zones under C. A. E.

Crop Management

Fertiliser recommendations for sugarcane to obtain 150 t/ha of sugarcane in red lateritic soils of Gadilum series of S. Arcot, N. Arcot, Pudukkottai, Dharmapuri and Trichirapalli districts, the following fertiliser schedules for different soil test values are recommended over the basal dose of 12.5 t/ha of FYM.

Soil test value kg/ha			Fertiliser recommendations with 12.5 tons of FYM/ha		
N	P	K	N	P	K
150	4	150	497	102	400
200	8	200	459	98	382
250	12	250	421	94	364
300	16	300	383	90	346
350	20	350	345	86	328
400	24	400	307	82	310
450	28	450	269	78	292

The low average yield of sugarcane in Padamathur sugarcane tract of Pasumpon Muthuramalingam district was attributed to poor soil fertility and soil related constraints such as soil compaction, poor infiltration, soil alkalinity, soil salinity, poor fertilization etc. The results of on-farm trials on integrated nutrient

management conducted in 31 farmers' holdings with sugarcane varieties viz., Co 6304, CoC 65061, Co 62175 and Co 671 revealed that combined application of soil test based NPK + $ZnSO_4$ 50 kg/ha + $FeSO_4$ 100 kg/ha + Gypsum 500 kg/ha + Azospirillum 3 kg/ha with any one of the organic manures such as pressmud or FYM or coirpith @ 12.5 t/ha recorded the highest mean cane yield of 112 t/ha whereas farmers practice recorded only 93 t/ha. This treatment fetched an additional net return of Rs. 4900/ha.

The distillery effluent diluted at 50 times with water recorded the highest cane yield of 144.8 t/ha closely followed by the irrigation water (135.3 t/ha) The commercial cane sugar percent was also found to be higher for 50 times dilution (10.05%) and was on par with water (10.50%).

Crop Protection

Experiments conducted for the control of sugarcane shoot borer, *Chilo infuscatellus* by spraying granulosis virus @ 10 inclusion bodies (IB/ml) clearly indicated that spraying of granulosis virus twice on 35 and 50 days after planting was sufficient for the effective control of this pest (5.8% dead heart) when compared to the unsprayed control (39.1% dead heart). Spraying virus solution resulted in significant increase in cane yield over untreated check. The yield was 137.0 t/ha in treated plots as against 126.0 t/ha in control.

Application of carbofuran @ 1.0 kg a.i/ha, sunhemp intercrop and padan @ 1.5 kg a.i/ha were effective in reducing nematode population in sugarcane fields. In addition, organic amendments like poultry manure (guano) @ 2.0 t/ha or neemcake @ 2.0 t/ha can be applied before planting sugarcane to control the nematodes.

TOBACCO

Crop Management

Basal application of 50 per cent recommended N as poultry manure or as neem cake or as enriched coir pith and top dressing of the remaining 10 per cent N as urea in two equal splits on 45 and 60 DAT recorded high cured leaf yield of 4275 kg/ha.

FORAGE CROPS

Crop Improvement

Varieties released

Co 1 Guinea grass : It is a selection from Coimbatore local. It is profusely tillering and more leafy and non-lodging with high leaf stem ratio. It is perennial, drought resistant as well as shade tolerant. It has quick regeneration capacity. It has recorded a mean green fodder yield of 160 tonnes per ha per year. It has a

yield potential of 250 tonnes per ha/year. It possesses high crude protein (10.0%), low crude fibre (26.64%) and high digestibility (IVDMD 67.6%). It is much relished by cattle. It can be propagated both by seeds and slips.

Co 8 Fodder Cumbu: It is a hybrid derivative of the cross 732 A x Sweet Giant Bajra. It is capable of giving a fodder yield of 30 tonnes per ha in 40-45 days when harvested at boot leaf stage. The plants are tall with profuse tillering and high leaf stem ratio. It has high protein content (13.9%) and high brix value (9.9°) conferring sweetness to the stem. It has high palatability and so relished by cattle.

Crop Management

A portable mini silo kudir for ensiling 100 kg of green fodder has been designed and developed. It is made of gunny bag (60 cm diameter and 100 cm height) covered by 600 gauge low density polythene bag. The ensiled material has pleasant aroma and the pH is within the acceptable limit (4.0-4.2) and it can be fed to one milch animal for 12 days.

Studies to identify a suitable legume as intercrop with cumbu napier grass have indicated that it was profitable to grow cumbu napier hybrid Co 1 with *Desmanthus* in 3:1 ratio. This combination recorded 311.3 t/ha/year. Experiments conducted at Paiyur have indicated that raising 3 rows of Co 1 cumbu napier grass combined with one row of *Clitoria* in furrow line or 3 rows of Co 1 grass in combination with one row of *Desmanthus* raised in solid stand would give green fodder yield of 189.8 t/ha and 177.9 t/ha respectively in addition good protein yield and digestability.

BIOTECHNOLOGY

RICE

Anther culture studies were carried out in 11 interracial F1 hybrids. Callus induction was initiated in MGY 1 medium supplemented with 2, 4-D (2.0 mg/l), Kinetin (0.5 mg/1) + Coconut water (5 % V/V). Callusing frequency ranged from 4.4 to 16.8 per cent. Regeneration was observed in MS media. Nakateshinsen bom/Ponni recorded highest regeneration frequency (57.7%) and the least frequency of 28.6% was recorded in Akinishiki / ASD 16 and Zuhio / ASD 16. Anther culture studies were also carried out in selected best progenies from four F2 interracial combinations. Callus induction ranged from 7.1 to 10.5 per cent and regeneration efficiency ranged from 28.0 to 52.6 per cent.

Anther derived interracial dihaploids (A1) from 16 cross combinations were studied. A1 plants within each cross had high coefficient of variation for plant height, tiller number and yield indicating that they were from different meiotic products. The dihaploids however record high pollen and spikelet fertility. Uniformity was observed in each A1 progency indicating their homozygous nature.

/lost of the crosses were early maturing types. Cozora/ponni recorded highest per plant yield of 18.6 g followed by Zuhie/vaigai and Co 37/ponni.

BLACKGRAM AND GREENGRAM

In calli induced from leaf bits of blackgram (*Vigna mungo)* and greengram *Vigna radiata*), root differentiation occured only in MS + NAA 0.5 mg l^{-1} + BAP).5 mg l^{-1} + Zeatin 0.2 mg l^{-1} + Methyl cysteine 1 mg l^{-1}. Protoplasts were solated from 7 days old mesophyll tissues of blackgram variety Co 1. Maximum yield of 3.2 × 10^6 protoplats/ml was obtained. Divisions were observed on the lth day in K 3 medium. Microcolonies consisting of 15-20 cells were observed on he 10th day after plating.

REDGRAM

The crossed embryos of *C. cajan* (Co.5) x *Atylosia scarasbeoides* and *A. lineta* x *C. cajan* (Co. 5), after 24, 30, 48 and 72 hours of pollination responded for callus formation (62%) in MS + 2, 4-D (2.5 mg/l) Kin (1.0 mg/l) + CH(200 mg/l)+ SUC (3.0%). But the embryos after 72 hours failed to initiate calli. The 5, 7, 9 and 11 days old selfed embryos when inoculated (Co 4, Co 5 and CoRG 5) they produced calli in large quantities.

GROUNDNUT

Immature ovaries of 12 different genotypes and peg tips of 5 different nterspecific crosses of groundnut were inoculated on MS medium supplemented with BAP (2.0 mg/l) + Sucrose 3%. Callus induction frequency of immature ovary was highest in TNAU 97 (69.00%) and in peg tip culture it ranged from 45.45% Co. 2 / *A. pusilla*) to 81-81% (Co. 1 / *A. pusilla*). The callus of Co 2 / *A. pusilla* esponded well for regeneration. Pollen fertility was tested using acetocarmine % stain and 100% fertile pollen was observed.

BREEDER SEED PRODUCTION

The breeder seed production programme has been formulated based on the onsolidated indent received from the Director of Agriculture, which includes the breeder seed requirement of corporate bodies and seedmen. The details of breeder seed production and supply during the year 1991-92 and the programme or the year 1992-93 are furnished below:

Sl.	Crop	Target for the year 1991-92 (q)	Breeder seed supplied during 1991-92 (q)	Programme for 1992-93 (q)
1.	Rice	230.50	233.05	201.30
2.	Millets	1.05	1.73	0 42
3.	Pulses	177.27	151.03	187.32
4.	Oilseeds	1007.02	545.40	1703.16
5.	Cotton	1.20	1.25	3.93
6.	Vegetables	3.11	1.07	—
	Total	1420.15	933.53	2096.13

HORTICULTURE

POMOLOGY

MANGO

Crop Improvement

Variety Released

Paiyur 1: The trees are dwarf, low spreading and suitable for high density planting @ 400 trees/ha against the recommended 100 trees/ha. Regular bearer with a mean fruit yield of 22.3 kg/tree (8,920 kg/ha) at ninth year after planting. Fruits are medium long, oval with yellow skin colour.

Crop Protection

In mango spraying Fluvalinate @ 0.2 ml/l or acephate @ 1 g/l two times at 10 days interval during flowering phase was effective in reducing the hopper incidence.

BANANA

Crop Improvement

Promising cultures

Hybrid 109 (Matti x Tongat) is resistant to nematode and Sigatoka disease. It is also found to be tolerant to salt injury. The mean bunch weight of this hybrid is 17.5 kg with 13.0 hands containing 324 fruits. In fruit shape and quality, it is similar to the choice cultivar Matti of Kanyakumari district, but the hybrid is a high yielder with the above special attributes.

Crop Management

The Robusta banana which received 150 : 35 : 330 g NPK/plant with Azospirillum recorded vigorous growth, early flowering and high yield. This treatment has recorded 42.90 t/ha. The cost benefit ratio was also maximum (1.0 : 2.6) due to this treatment.

In poovan banana the foliar application of urea at 1% in combination with muriate of potash at 2.0% has increased the yield by 25% over control. The cost-benefit ratio was 1.0 : 4.49 due to this treatment compared to 1.0 : 3.24 in the control.

ACID LIME

Crop Management

Application of *Glomus mossae* to acid lime nursery bed at 25 cm below the soil level produced vigorous seedlings and 61.4% VAM colonization.

GRAPES

Crop Management

The pre-harvest spray of 0.6 per cent calcium chloride at 10 and 20 days prior to harvest extended the shelf life upto eight days. The quality of fruits in terms of T. S. S. was also found to be high in calcium chloride treatment.

PAPAYA

Crop Improvement

The critical studies on floral biology of Co 2 papaya led to the isolation of a marker male tree with reddish orange tapetum in anthers.

Crop Management

Application of NPK at 50 : 50 : 50 g/plant at bimonthly interval starting from 4th month of planting recorded highest fruit yield of 110 fruits weighing 202 kg in 20 months duration. The papain yield was also highest (6.3 g/fruit).

The optimum size of shoot tip for maximum response in tissue culture was 10 cm. The addition of coconut water at 10% V/V in the M.S. medium increased the shootlet per explant in papaya shoot tip culture.

SAPOTA

Crop Improvement

Variety Released

PKM 2: The PKM 2 hybrid sapota with a mean annual yield of 1400 fruits weighing 80 kg/tree with an estimated yield of 12,500 kg/ha at 10th year of planting was released. It has accounted for 42.6 per cent increase over PKM 1 sapota. The fruit of this hybrid is oval in shape and bigger in size (93.4 g) compared to PKM 1 (84 g PKM 1). The fruits are of good quality with high T.S.S. (26.3°), high total sugars (14.3%) and high sugar/acid ratio.

Crop Management

Soaking of sapota seeds in IAA at 100 ppm for 24 hours hastened and completed the germination process in 25 days compared to 40 days in untreated seeds.

JACK

Crop Improvement

Variety Released

PALUR 1: Suitable for high density planting. It yields during both regular and off seasons. The fruit quality is good. It has registered higher fruit yield than both Panruti and Singapore Jack. Harvesting starts from fifth year. It gives an average yield of 684 kg/tree.

GUAVA

Crop Management

A combination spray consisting of zinc sulphate, magnesium sulphate and manganese sulphate (0.5%) and copper sulphate and iron sulphate (0.25%) sprayed four times at new flesh, one month after flowering and fruit set controlled the bronzing leaf malady. The cost of spray per hectare was Rs. 250. The coot benefit ratio was 1.8.

Crop Protection

In guava a waiting period of three days is suggested after 0.05% malathion spray against tea mosquito bug.

Malathion 0.1% followed by monocrotophos 0.04% and neem oil 2% sprayed twice at pea stage of fruits and a second spray 15 days later were found effective in reducing tea mosquito bug incidence and corky growth in fruits.

SWEET ORANGE

The soil application of 75 g each of $ZnSO_4$ and $MnSO_4$ + 5 kg FYM / tree along with three foliar spray of micronutrients of 0.5% $ZnSO_4$ + 0.5% $MnSO_4$ + 0.1% urea at monsoon season corrected the little leaf with intervenial chlorosis and increased the yield of fruit. The cost of treatment was Rs. 7.50 per tree. The additional income by the treatment was Rs. 32.50 per tree.

MANDRIN ORANGE

Crop Management

Spraying 0.5% KNO_3 at flowering and fruiting stages increased the fruit number and yield and ascorbic acid content. It was also found that foliar feeding of 0.5 per cent $CaSO_4$ had also increased the fruit number, yield, fruit weight and TSS of fruit.

Crop Protection

Spraying fenthion at 0.5% or monocrotophos at 0.036% or methyl parathion at 0.05% or phosphamidon at 0.03% gave 100 per cent control against aphids and 79 per cent control of green scales.

TAMARIND

Crop Improvement

Variety Released

PKM 1 : A high yielding tamarind variety PKM 1 was released during this year with yield potential of 263.3 kg/tree as against 165 kg in local cultivars. The pulp recovery is 39 per cent.

PEAR

Crop Management

For common pear, application of 800 : 400 : 600 g NPK / tree / year was found beneficial for good yield.

OLERICULTURE

TOMATO

Crop Improvement

mising Cultures

CoTH 2 Hybrid Tomato : The indeterminate CoTH 2 hybrid recorded a mean 1 of 69.8 t/ha. The fruits are formed in cluster of 5 - 7 which are plot with 6 - 7

grooves. Fruits are deep orange red in colour. The average fruit weight is 150 g. This culture is under ART.

Crop Management

In Co 3 tomato irrigation at 0.9 IW/CPE registered the highest yield of 32.4 t/ha. This treatment was found to be economical with high cost benefit ratio of 1.0 : 2.18,

BRINJAL

Crop Improvement

At Killikulam the accession KSM 107 was found best for irrigated red soil with a yield of 1.72 kg/plant.

Crop Management

Irrigating brinjal at 0.8 IW / CPE ratio with application of 100 kg N/ha gave high yield of 12.6 tons/ha. This treatment consumed 625 mm of water/ha.

Crop Protection

Spraying of carbosulfan 0.05% four rounds at 20 days interval from fruit set was most effective in controlling the brinjal fruit borer with highest yield of 18,330 kg/ha.

BHENDI

Crop Management

Raising amaranthus cultivar Co 1 as mixed crop in bhendi was found effective in suppressing weed growth during first 25 days of growth of bhendi with cost benefit ratio of 1.00 : 1.76.

CHILLI

Crop Improvement

Promising Culture

At Paramakudi the culture CAPM. 27 with a yield potential of 2.5 t/ha under semidry condition has been forwarded to ART.

Crop Management

In Co 3 chilli application of 160 kg N/ha at a closer spacing of 30 x 15 cm resulted in the highest dry pod yield of 3980 kg/ha against the lowest N 70 kg/ha at that spacing.

Application of Azospirillum in combination with 56 kg N/ha in split dose was found effective for high yield in local Gundu chilli.

Chilli with bhendi as intercrop under normal row system recorded the highest gross income of Rs. 29,660/ha compared to Rs. 19,400/ha under semi dry conditions.

Crop Protection

Top dressing with 75 kg N/ha as ammonium sulphate in three splits along with spraying phosalone 35 EC (2 ml/lit) on 30th, 60th and 90th day of planting was found effective in controlling the chilli muranai mite *Polyphagotarsonemus latus*.

VEGETABLE LAB LAB

Crop Improvement

nising Culture

The vegetable lab lab selection HD 18 continued to recond the highest yield. It recorded mean yield of 18.8 tons of green pods/ha over 1986 to 1990. Besides its high yield potential, the pods are thick, fleshy with attractive green colour Hundred pod weight ranged from 800 - 900 g. This culture is under ART.

BITTERGOURD

Crop Improvement

At Coimbatore, the hybrid combinations Priya x CBE Local, Priya x Co 1 and NCBT x Phule 3G. 6 were found to be superior in performance.

Crop Management

Spraying Triacontanol at 5 ppm first at fourth leaf stage and second at vining stage resulted in 120 per cent increase in yield. (16.04 t/ha against 7.32 t/ha in the control).

CUCUMBER

Crop Improvement

Promising Cultures

C. S. 58 : This selection from Periyakulam has recorded a yield of 16.07 t/ha against 14.2 t in Co 1. This culture is under ART.

WATER MELON

Crop Improvement

Promising Culture

At Periyakulam the culture CV. 11 has recorded 44.3 t/ha. The fruit is ovate and abovate in shape with fruit weight of 10 kg and with a TSS of 9.2 brix. This culture is under ART and MLT.

ONION (Aggregatum)

Crop Improvement

Promising culture

At Periyakulam, the culture AC 83 has recorded a yield of 17.2 t/ha as against 14.3 t/ha in Co 4 and this culture has been sent to MLT and ART centres for evaluation.

BELLARY ONION

Crop Management

The three season trials in Bellary onion have indicated that the treatment 200 : 150 : 75 kg NPK/ha recorded a mean yield of 16241 kg/ha.

CASSAVA

Crop Improvement

Promising Culture

ME 120 : At Periyakulam the cassava selection ME 120 continued to perform well with a yield of 52.6 t/ha during 1991 and a cumulative yield of 54.06 t/ha from 1987 to 1991. This culture also possesses field resistance to CMD. This culture is being tested under ART/MLT.

Crop Management

In cassava 75 × 75 cm spacing and 75 : 25 : 75 kg NPK/ha were found *to* be optimum for high yield.

COLEUS

Crop Improvement

Promising Culture

From Department of Horticulture, AC & RI, Killikulam the cultute TCP 10 is being tested under MLT.

op Management

Application of 60 kg nitrogen, 150 kg potassium and 2 kg/ha of Azospirillum as soil application registered the highest tuber yield of 31.1 t/ha with the cost benefit ratio of 1.00 : 3.96.

GARLIC

Crop Management

In garlic application of NPK @ 100 : 30 : 100 kg / ha was found optimum for high yield of 15.17 t/ha as against the low yield of 9 t/ha in 100 : 60 : 50 kg NPK/ha.

BEET ROOT

Crop Improvement

Variety Released

Ooty 1 : It is a high yielder (31.45 t/ha). The crop duration is 120-130 days for direct sown crop and 135 to 150 days for transplanted crop. The seed yield is 1.5 to 2.3 t/ha. It is suitable for growing in all seasons. It has attractive blood red colour with thin skin and good cooking quality.

FLORICULTURE

ROSE

Crop Improvement

Variety Released

Yercaud 2 : It is a selection from open pollinated bulk progeny ACC. 1043. The flower yield is 150 - 200 flowers per plant. The colour of the unopened flower is bright yellow and the fully opened flower is scarlet red with yellow tinge at the base. It is a semi-dwarf plant suitable for hill range of 1000-2000 feet above MSL.

Crop Management

Nutrient requirement studies for Happiness rose variety under Yercaud conditions indicated that application of 75 : 150 : 50 g of NPK per plant increased the flower yield and size of the flowers.

GERBERA

Crop Improvement

Variety Released

YCD 1 : It is early and high yielding, each plant producing on an average 55 flowers/plant/year. The flowers are double, with the petals arranged closely in

concentric whorls and with a long flower stalk and a good vase life of 7 to 8 days. It is a dwarf perennial plant and flowers in 45 days after planting. It is suited for growing in hill ranges of Tamil Nadu at an altitude of 1000-2000 M.

CROSSANDRA

Crop Management

Application of nitrogen at 60 kg/ha, Azospirillum inoculation @ 2 kg/ha three months after planting and ascorbic acid @ 1000 ppm spray was found to be economical recording 2237 kg/ha of flower yield, the cost benefit ratio being 1.0 : 3.45.

The maximum quality seeds was obtained when the crop was raised at 60 × 60 cm spacing. The seeds attained the physiological maturity at about 55 - 60 days after flowering. The seeds can be stored for 6 months with seed treatment of either captan or bavistin @ 2 g/kg of seeds.

SPICES, PLANTATION CROPS, MEDICINAL AND AROMATIC PLANTS

TURMERIC

Crop Improvement

At Coimbatore, the culture TC. 2 (5303-3-3) has given the highest mean yield of 36.5 t/ha. This mutant possesses a curing per cent of 19.2 and a high curcumin content of 4.48 per cent.

At Bhavanisagar the turmeric accession BS 43 was found to give an average yield of 35 t/ha raw rhizome with higher curing ratio (18%). Fingers are medium sized with bright colour. It is also tolerant to scale insect.

Crop Protection

Application of sheep manure at the ratio of 10 t/ha in two splits one basal and the other at the time of earthing up or poultry manure 5 t/ha in two splits, followed by drenching dimethoate (2 ml/lit), phosalone (2 ml/lit), carbofuran 1.5 kg ai/ha gave effective control of tumeric scale in the field.

COFFEE

Crop Management

The results at Yercaud indicated that application of 120 kg N/ha + Azospirillum (10 kg/ha) recorded the maximum mean coffee yield against N alone.

PALMYRAH

Crop Improvement

Variety Released

SVPR 1 : It is a semi-dwarf type with high yield of Padaneer (298 l/palm/yr). The tapping duration is 97 days in a year. The jaggery content is 144 g per litre with a recovery of 13.16 per cent. It has also recorded high brix of 13 3°. *The fruit yield is 140 per palm per year. It is suitable for growing in entire Tamil* Nadu.

Crop Management

Application of VA mycorrhiza+Azospirillum+FYM (25 kg/palm/year) gave the highest yield of Padaneer. Foliar application of 1% urea also gave the highest yield of Padaneer.

In seed germination studies fruit containing one seed each registered 85.7 per cent germination while seed completely cleaned of fruit tissue recorded the maximum value of 90 per cent.

CASHEW

Crop Management

Studies indicated that establishment of 31.1 to 43.0 per cent could be recorded in November month adopting veneer method of grafting while in flesh grafting the establishment ranged between 47.0 and 57.0% when the graft was prepared using 35 days old scion material on 35 day seedling.

Crop Protection

As a prophylactic measure against cashew stem and root borer, swabbing of coal tar; Kerosene (1:2) or BHC 0.2% on the trunk to a height of 1 m after peeling off the lose bark and brushing off the eggs once in six months during May and November is recommended.

BETEL VINE

Crop Management

Spraying of zinc sulphate 0.5% thrice at weekly intervals starting from the 10th day after the last split application resulted in increased yield of 6.95 per cent.

Crop Protection

Spraying four rounds of bitemand 0.025% and 0.05% at intervals of 20 days starting from the first appearance of the anthracnose disease had resulted in maximum control of the disease and maximum yield of betel leaves,

HOME SCIENCE

A "fireless cooker" was designed with the dimension of 45 cm in length, width as well as height. The box was insulated with hay at the bottom and sides. A vessel place was compressed and moulded in the centre for placing the material to be prepared. A flat insulated (hay) gunny bag was prepared to keep at the top of the vessel. The designed fireless cookers' efficacy was studied with traditional dishes indicated that the hay box cooker is a potential energy conserving simple device. This can be popularaised at rural domestic level.

The incorporation of germinated pulse flours in cereal malt will enhance the quality of protein. The pulses like greengram, cowpea, horsegram and bengal gram flour were incorporated at 5%, 10%, 15% and 20% levels in cereal malts ragi, bajra and wheat. The results indicated that the pulse flours can be incorporated at 20% level in cereal malt with the overall acceptability of 78.98%. The addition of pulse flour increases the nutritive value and flavour components of the malt The addition of protein component will help to reduce the protein malnutrition among pre-schoolers and the same is suitable for all age groups and invalids.

Studies on the formulation of snack foods (cookies and puffed soya) using soybean, their acceptability and nutritive value

The puffing quality of seven cultivars of soybean was determined, The varieties included were Co 1, Local, khsb-2, Hardee, MACS-124, UGM-30 and UGM-34. It was observed that soaking in 5% salt and 3% $NaHCO_3$ soution and puffing in hot sand bath (240-250°C) for 4 to 5 min was found to be optimum for puffing the soybean. The values of chemical analysis of soybean vatieties were estimated. After puffing, the moisture content was reduced and the reduction ranged between 1.07 to 1.64g%. The protein content was found to be maximum in khsb-2 (42.0g%) and minimum in MACS-124 and Co 1 (38.50g%) in the raw soybean. After puffing the protein content of soybean was found to increase in all the varieties. With respect to fat and ash content there was not much difference.

A study on the effects of socio-economic status on the nutritional status of the preschool children (1-5 years) in selected areas.

The study revealed that there were more families belonging to low socio-economic status in the rural area than in the semi urban area. There was a positive correlation between the socio-economic status of the family and the anthropometric measurements of the perschool children in both rural and semi urban areas. The major nutritional deficiency diseases observed were anaemia, angular stomalities and their depigmentation in both the areas.

The study indicated that nutrition and health education should be given to the mothers so that the children will be able to grow in a normal and healthy manner. Necessary measures should be taken to improve the income levels of the family.

FORESTRY

Curtailing nursery period in a few tree legumes using microbial inoculants.

With a view to invigorate the seedlings through induced microbial association and there by reduce the nursery period, four tree legumes viz. *Acacia auriculiformis, A. nilotica, Albizia lebbeck* and *Hardwickia binata* were inoculated with different strains of *Rhizobium* and field planted when seedlings were just four months old. Conjoint application of *Rhizobium* and VA mycorrhiza also constituted another treatment. Traditional method of planting 6 months old uninoculated seedling served as control. Data recorded 5 months after planting revealed that in all cases of induced microbial association, premature planting did not vitiate the survival. In *A. auriculiformis*, the microbial association also enhanced seedling growth in terms of height and cellar diameter. The study indicated that it was possible through microbial manipulation to curtail the nursery period without sacrificing the survival rate and seedling growth.

Maximising plantation productivity *Eucalyptus camaldulensis* through nutrient management

Eucalyptus is raised over an area of more than 50,000 ha in the Pudukkottai region by the Tamil Nadu Forest Plantation Corporation. But over the last decade or so, the unit area productivity has declined from around 50 kg/ha to less than 30 kg/ha. The Corporation is therefore eager to arrest the sagging yield and restore it to its original level. At its instance, on - site experiments have therefore been initated at Pudukkottai. Major nutrients of N, P and K have been applied in different combinations with or without biofertilizers like *Azospirillum* and VA mycorrhiza. The results revealed that from an economical standpoint, a nutrient level of N_{60} P_{60} K_{60} found to be the optimal. The study clearly points to the promise of maximising productivity of *Eucalyptus* plantations through nutrient input.

Effect of legume-grass mixture in a silvipastoral system on two year growth of the tree component

Silivipastoral systems involving three fodder trees each grown with three grass/grass - legume mixtures viz *Cenchrus* alone, *Cenchrus* + *Desmanthus* and *Cenchrus* + *Clitoria* revealed no adverse effect of the understorey on tree growth in terms of either height or diameter.

eed pelletisation for dry - zone afforestation in neem

To assess the efficacy of seed pelletisation on seed viability and vigour in eem, various biocides, bio-fertilizers, nutrients and hydrophilic agents were valuated for pelletisation of neem seeds. The results indicated that biocides and utrients had no influence on seed viability or vigour. But all biofertilizers enhaned these parameters equally well. Alletin, a hydrophilic agent also proved as fficacious as the biofertilizers.

Effect of seed coat colour on viability and vigour in soapnut (*Sapindus emerginatus*)

Seeds of *Sapindus emerginatus* present a mottled appearance varying from light brown to black. To evaluate the association, if any, between testa colour and germinability, seeds were visually classified into three categories of light brown, brown and black and each group was evaluated for viability and vigour. Black seeds, though characterised by less weight, recorded highest root length. Germination, however, did not significantly differ from the bulk.

AGRICULTURAL ENGINEERING

A process has been developed to make particle board from coirpith at Coimbatore. Starch, gelatinised with sodium hydroxide was found to be an economical adhesive material for the board making using coirpith. The boards showed good accustic and insulation properties, besides being fire resistant as well as termite proof. The average cost of production of a particle board of one square foot area was estimated to be Rs. 3.50/- which was much less than that of the commercial plywood boards.

An easy method for the removal of cassava skin by chemical means (lye-peeling) has been developed by dipping the tubers in sodium hydroxide solution at 85-90°C temperatures for 4-7 minutes and subsequently washed using a high pressure water-jet for one minute.

An electromagnetic seed treater of 0.5 kg/batch capacity was designed and developed with provision for regulating the magnetic flux densities for treating seeds prior to sowing. The treater was evaluated using two crops namely, sunflower cv Co 2 and greengram cv Co 4. Sunflower seeds at a moisture content of 6 per cent (wb) when treated magnetically at 200 gauss for 4 hours gave a yield increase of 27.3 per cent over control. Greengram seeds at 8 per cent (wb) moisture when treated at 200 gauss for 7 hours gave an increase of 86.7 per cent over control.

Crop residues such as maize cobs, groundnut shell and wood chips can be used in down draft gasifier and diesel engine pumpset of 5 HP capacity can be run thereby saving diesel upto 70%. The average wood consumption is 4 to 5 kg per hour.

For rectification of defective biogas plant constructed by the untrained masons, the farmers are not able to detect the leakage spot to take up the repair work. A simple power sprayer aided test kit has been developed and biogas plant owners can attach a simple kit to the power sprayer costing about Rs. 150/- with which the leakage spot can be detected by sprinkling soap solution over the dome for carrying out the rectification.

TNAU chulha is a single pot mud chulha for biomass burning. The efficiency of the chulha ranges from 19% to 27%. Agricultural wastes viz., cotton stalk (23%)

maize cob (27%), redgram stalk (24%), coconut rachis (21%) and jowar stalk (19%), wood and prosopis can be used in this chulha. The single pot chulha with double wall burns well without smoke. The cost of the chulha is Rs. 25/-

Hand cum pedal operated Chaff Cutter has been developed. It is useful for cutting green and dry fodder. It helps to reduce the drudgery of operator. Its cost is only Rs. 1200/-

Axial flow pump attachment to power tiller has been designed which is an attachment to power tiller and useful to pump large quantity of water at low levels. It costs Rs. 4000/-.

Corcyra egg-scale separator has been developed. It is a device used for cleaning the egg-scales from the eggs of corcyra. It costs Rs. 1200/-

The following implements have been developed and they will be released for the benefit of the farming community:

A groundnut pod grader has been developed, which consists essentially of a feed hopper, reciprocating sieve assembly, blower and outlets for collecting various fractions of the feed material. The unit is mounted on four iron wheels, for easy transportation.

The capacity of the grader is 350 kg of pod per hour with a grading efficiency of 97%. The cost of the equipment is Rs. 45,000/-

Bullock drawn single row seed drill:

Suitability	:	To sow seeds like groundnut and sorghum in dryland
Coverage	:	0.4 ha/day
Cost	:	Rs. 500/- (Seed meter unit alone)

Bullock drawn turmeric digger:

Suitability	:	To dig out turmeric tuber
Coverage	:	0.5 ha/day
Cost	:	Rs. 500/-

Power sprayer operated tall tree sprayer:

Suitability	:	To spray chemicals to trees upto height of 5 meters.
Coverage	:	100 trees/day
Cost	:	Rs. 1000/- (Sprayer attachment alone)

Liquid urea injector (manual) :

Suitability : To inject urea solution at root zone of paddy crop which will improve nitrogen use efficiency of the crop.

Coverage : 1.0 ha/day

Cost : Rs. 1300/-

AGRICULTURE AND RURAL DEVELOPMENT STUDIES

An appraisal of oilseeds production in Tamil Nadu

Groundnut

The area under rainfed groundnut was found to decrease by 1.82 per cent per annum during 1966-67 to 1986-87 while that of irrigated groundnut was estimated to increase by 2.53 per cent annually. The total area under groundnut (rainfed + irrigated) exhibited a negative growth rate of 0.81 per cent.

The mean yield of irrigated, rainfed and total groundnut (irrigated + rainfed) in Tamil Nadu was 1634 kg, 885 kg and 1028 kg of pods per ha and they exhibited a coefficient of variation of 10.49 per cent, 16.50 per cent and 14.20 per cent respectively.

In Tamil Nadu, the yield of groundnut (total) had grown by 1.20 per cent annually, but due to the significant, negative growth rate in area, the production remained to be stagnant around 9,81,882 tonnes with a coefficient of variation of 16.30 per cent. The irrigated crop which occupied 21.56 per cent of the total area contributed to 41.74 per cent of the production of groundnut in Tamil Nadu.

Gingelly

The total area under gingelly ranged from 76,871 ha to 1,87,857 ha with a mean of 1,16,976 ha and a coefficient of variation of 21.26 per cent. The total area under gingelly was found to decrease by 1.57 per cent annually.

Rainfed area contributed to 84.21 per cent of the total area with a mean of 98,502 ha, which was found to decrease by 2.40 per cent annually.

The yield of gingelly (rainfed and irrigated combined) varied by 9.27 per cent in Tamil Nadu during 1966-67 to 1986-87 which exhibited a positive growth rate of 0.63 per cent with a mean of 325.67 kg per ha.

The production of gingelly was stagnant during the above period which remained around 38,200 tonnes annually.

More than 63 per cent of the selected farmers did not apply fertilizers to rainfed gingelly due to lack of funds and about 70 per cent of the farmers did not follow any plant protection measure.

Sunflower

Area under sunflower exhibited very wide variations ranging from 56.38 per cent to 104.48 per cent in the districts. The mean area under sunflower was 12,265 ha in Tamil Nadu which varied by ± 57.28 per cent.

Madurai, composite Ramanathapuram and Thirunelveli districts exhibited a positive growth rate while Dharmapuri had shown a negative growth rate leading to a stagnance in the State.

Rainfall during the time of seed setting, damage by birds and poor seed germination were the major constraints faced by sunflower growers in Tamil Nadu.

Cost price relationship in major crops of Madurai region

The study on cost-price relations for eight paddy varieties, four rainfed cholam varieties, two rainfed and two irrigated cotton varieties, two rainfed and one irrigated groundnut varieties was conducted in Madurai, Kamarajar, Pasumpon Muthuramalingam, Dindigul Anna (Erstwhile Quid-E-Melleth) and Ramanathapuram districts of Madurai region indicated the following:

Wide inter - varietal variations in yields of paddy were observed and they ranged from 23.38 q for Co 36 variety in Ramanathapuram to 58.78 q for IR 36 paddy in Dindigul Anna district. The cost of cultivation per hectare varied from Rs. 6004.21 for Co 37 in Ramanathapuram to Rs. 11,630.66 for Co 43 in Dindigul Anna district. The cost of production per quintal fluctuated from Rs. 161.07 for IR 36 in Dindigul Anna district to Rs. 218.76 for Co 37 paddy in Ramanathapuram district.

The coefficient of variations of cost was as high as 34.30 per cent for IR 20 in Pasumpon Muthuramalingam district and it was the least with 18.57 per cent in Dindigul Anna district. The fluctuations of yield varied from 18.76 per cent for IR 20 paddy in Ramanathapuram to 29.40 per cent for the same variety in Madurai district. The variations in return ranged from 18.62 per cent for IR 20 in Ramanathapuram district to 26.40 per cent for the same variety in Madurai district. These indicate the scope for narrowing down the yield gaps of the different varieties of crops by adoption of recommended levels of technologies and thereby stabilise the same.

Spatial and temporal variations *in cost and returns* of principal crops in Tamil Nadu

Among the different inputs used in the cultivation of paddy, human labour formed the major share of operating cost, ranging from Rs. 3719.50 in Thanjavur to Rs. 4380.03 in South Arcot, with an average of Rs. 4116.14 per hectare. Next to human labour manures and fertilizers formed the major part ranging from Rs. 276.75 in North Arcot to Rs. 502.90 in Thanjavur.

The share of bullock and machine labour ranked third in the operating cost amounting to Rs. 1817.10. The share of seed cost in the operating cost was 5.29 per cent. Rental value of owned land ranged from Rs. 1740.61 to 2526 69. The total cost worked out to Rs. 11061.60 per hectare in the State. The operating cost ranged from Rs. 6229.90 in North Arcot to Rs. 8900.17 in Chengleput district. Maximum yield of 54.34 q per hectare was obtained in Thanjavur district with an average of 46.28 quintals in the State. The returns over operational cost were highest in North Arcot district. The cost of production per quintal was Rs. 7263.15/ha. Operational cost ranged from 108.21 in North Arcot to 193.23 in Chengleput district. When total cost was considered, cost of production ranged from Rs. 167.24 in North Arcot to Rs. 225 in Chengleput district with an average of Rs. 193.88 in the State.

The total cost of inputs used for crop and livestock activities varies from Rs. 6,608 in medium size group of southern dry zone to Rs. 14492 in small farms of north eastern zone. Among different zones, cauvery delta zone has the highest per hectare farm expenditure (Rs. 9281.76) followed by north eastern zone, western zone and southern zone. For the state as a whole the average per hectare farm expenditure was Rs. 8523.43. Among different size groups, small farms spent more (Rs. 12145.35) when compared to medium (Rs. 7834.59) and large (Rs. 7949.58) size groups.

Adoption of Agricultural Technologies

In rice and turmeric crops each, about 75 per cent of farmers had adopted the recommeded organic as well as NPK fertilizers. Plant protection chemicals, herbicide and water management practices each accounted for adoption percentage of about 40 - 50. Optimum population registered about 55 per cent against paddy and 72 per cent against turmeric. The percentage for certified seed and seed treatment ranged from 30 to 38 per cent. The two practices - micro nutrients and improved implement each accounted for about 20 per cent.

The farmers wanted technologies to increase the output, reduce labour cost and drudgery. The specific needs of farmers in favourable area were new equipments and implements for turmeric sowing, interculture and harvesting. Besides they needed better varieties than Co 1, Co 2 and BSR 1 in turmeric. In less favourable area, the technology needs are low cost technologies to tide over the frequent drought and package of practices for rainfed maize.

Awareness level of Cauvery delta farmers about TRRI technologies in general

Nearly half of the respondents (45.56%) possessed high level of awareness, 30.0 per cent possessed medium level of awareness and the remaining one-fourth possessed low level of awarness.

High level of knowledge was noticed among 40.0 per cent, medium level among one-fourth (25.55%) and low level among one-third (34.45%) of the respondents.

WATER TECHNOLOGY

The ORP on moisture stress management for Kuruvai rice under turn systems of irrigation in Thanjavur district revealed that the applications of Azospirillum (20 pkts) coupled with extra dose of 50 kg N/ha increased the rice yield from 12.4% to 22.6% over the farmers practice at different locations. The increase in net income varied from Rs. 1897 to 2806 per ha.

The studies on water stress management in rice at Madurai revealed that the 7 days stress period reduced the rice grain yield by 38% compared to control (6371 kg/ha). The maximum grain yield was obtained with the combination of treatments viz., seed hardening with KCl 1% and with CCC 500 ppm and foliar spray of 1000 ppm of CCC at critical stages. This treatment recorded a grain yield of 5723 kg/ha compared to control (4793 kg/ha). The maximum return was Rs. 20961/- with this combination treatment.

The tillage and irrigation management studies for direct sown semidry rice under simulated water release pattern was tested at Madurai from 1989 to 1991. The results indicated that dry ploughing 6 times before sowing was ideal to get high grain yield for direct sown semi-dry rice. The semi-dry rice crop should be innundated 20 DAS without much reduction in yield. Further delay in innundation beyond 20 DAS caused considerable yield loss.

It was found at Thanjavur that the sprinkler irrigations were the best for greengram. This method recorded a yield of 841 kg/ha of grain consuming 148 mm of irrigation water in 7 irrigations with a water use efficiency of 5.68 kg/ha/mm. The next best was splash irrigation which recorded 725 kg/ha of grain consuming 170 mm of water in 8 irrigations with a WUE of 4.28 kg/ha/mm. The conventional irrigation gave a yield of 602 kg/ha of grain consuming 295 mm in 4 irrigations with a low WUE of 2.04 kg/ha/mm.

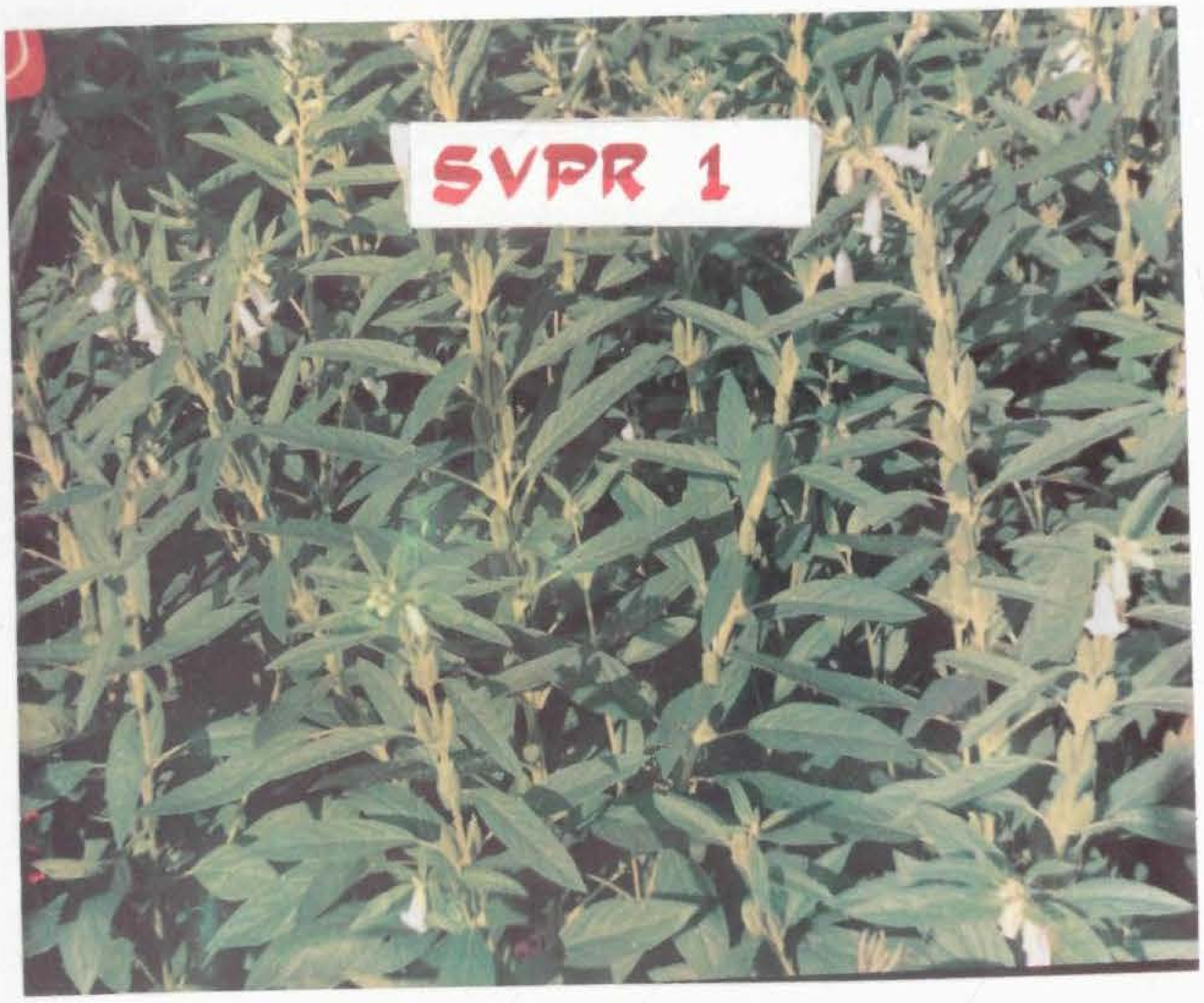
The moisture stress management in sugarcane under intercropping systems at Thanjavur showed that the normal yield of cane could be obtained by irrigating once in 14 days when soybean was intercropped on the sides of the rows (224 t/ha).

In sugarcane intercropping system study at Bhavanisagar, three IW/CPE ratio and two intercrops viz., blackgram and soybean were tried during 1989 - 90 and 1990 - 91. It was found that sugarcane yield and blackgram yield were high at 1.0 IW/CPE ratio and fetched the highest net profit due to the high price of blackgram compared to syobean.

A computer model named TEASI using BASIC had been developed to assess the economic feasibility of a sprinkler system. The model was tested at Madurai on groundnut. It was found that a minimum of 2 ha of land is required to utilise the sprinker systems profitably. The semi portable system with a minimum of two shifts per day is most advantageous to the farmers realising at high benefit cost ratio. The optimum area of irrigation is 5 ha and it was uneconomical to irrigate more than 10 ha. Considering the cost of pipes, plastic pipes are preferable to metal pipes. The shadow price of water must be 65 paise per cubic metre to run the system cost effectively.

The studies on crop sequence under constraints of irrigation water at Madurai revealed that the new crop sequence viz., groundnut-rice-blackgram gave the higeest net return of Rs. 14478/ha which was 20% more over the traditional sequence of rice-rice-blackgram (Rs. 11650/-). Further, the new cropping system consumed 190 cm of water which was 22% less than the traditional crop sequence which consumed 242 cm of water.

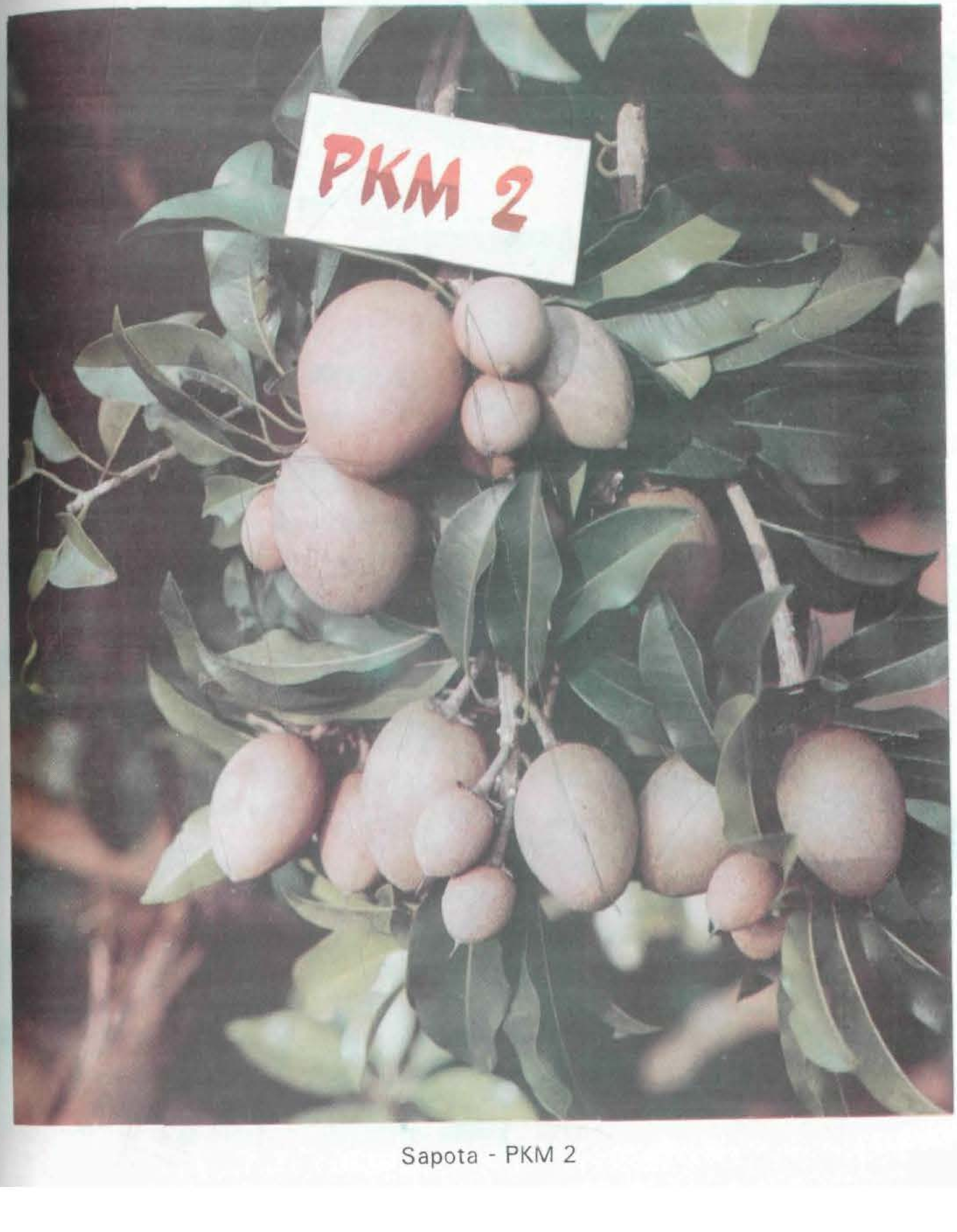
Rice - TKM 10



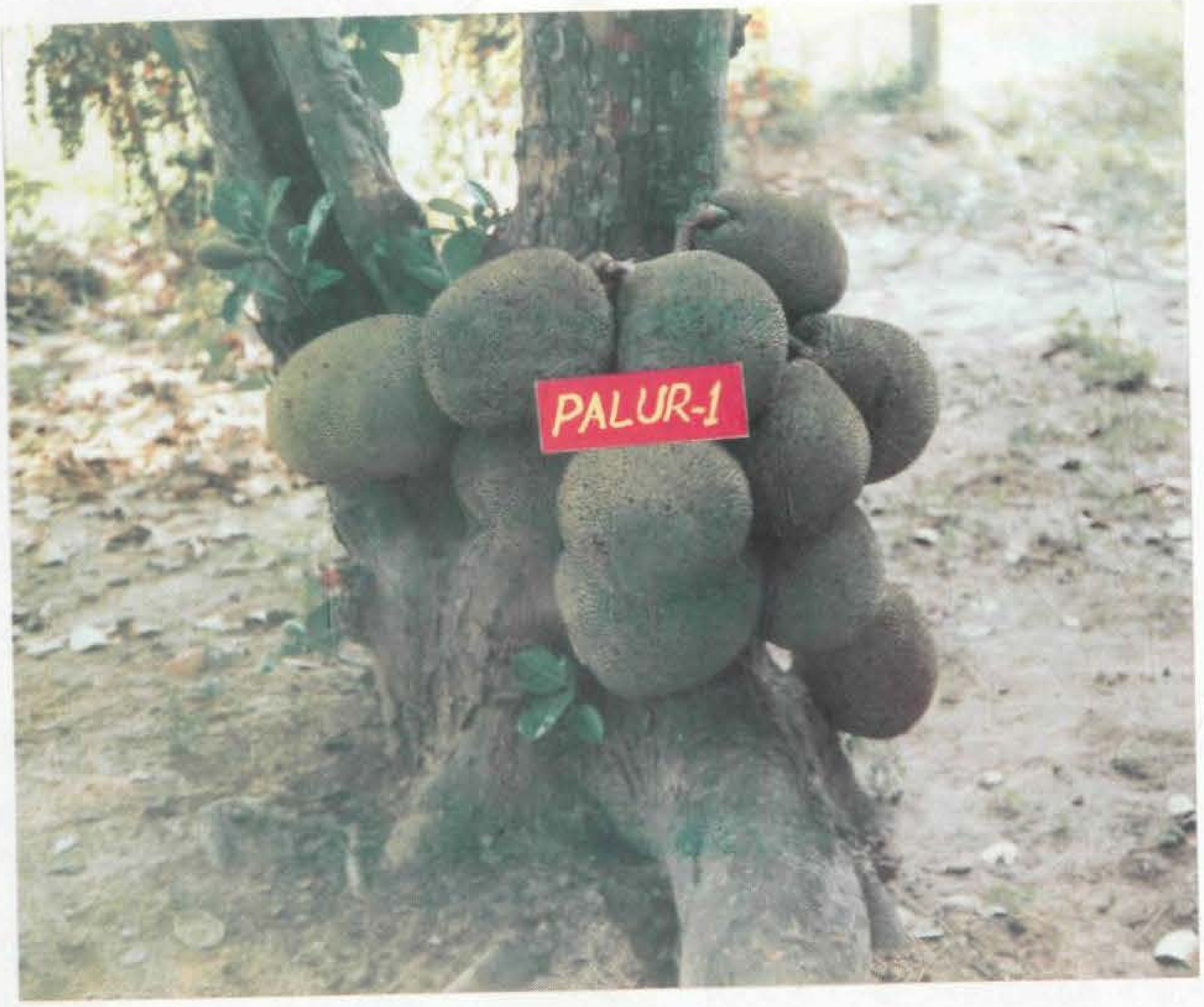
Sesame - SVPR 1

Fodder Cumbu - Co 8

Mango - Paiyur 1



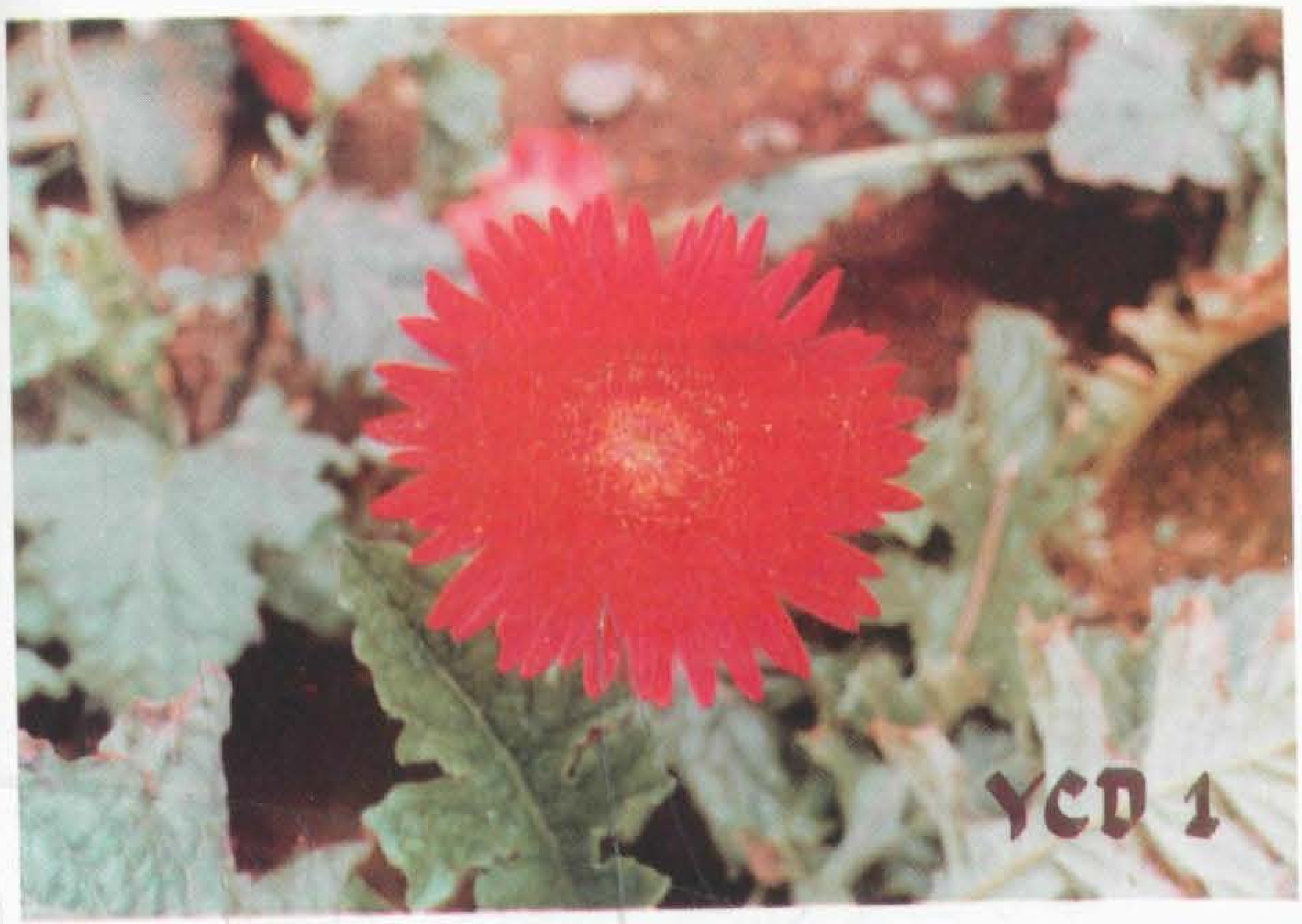
Sapota - PKM 2



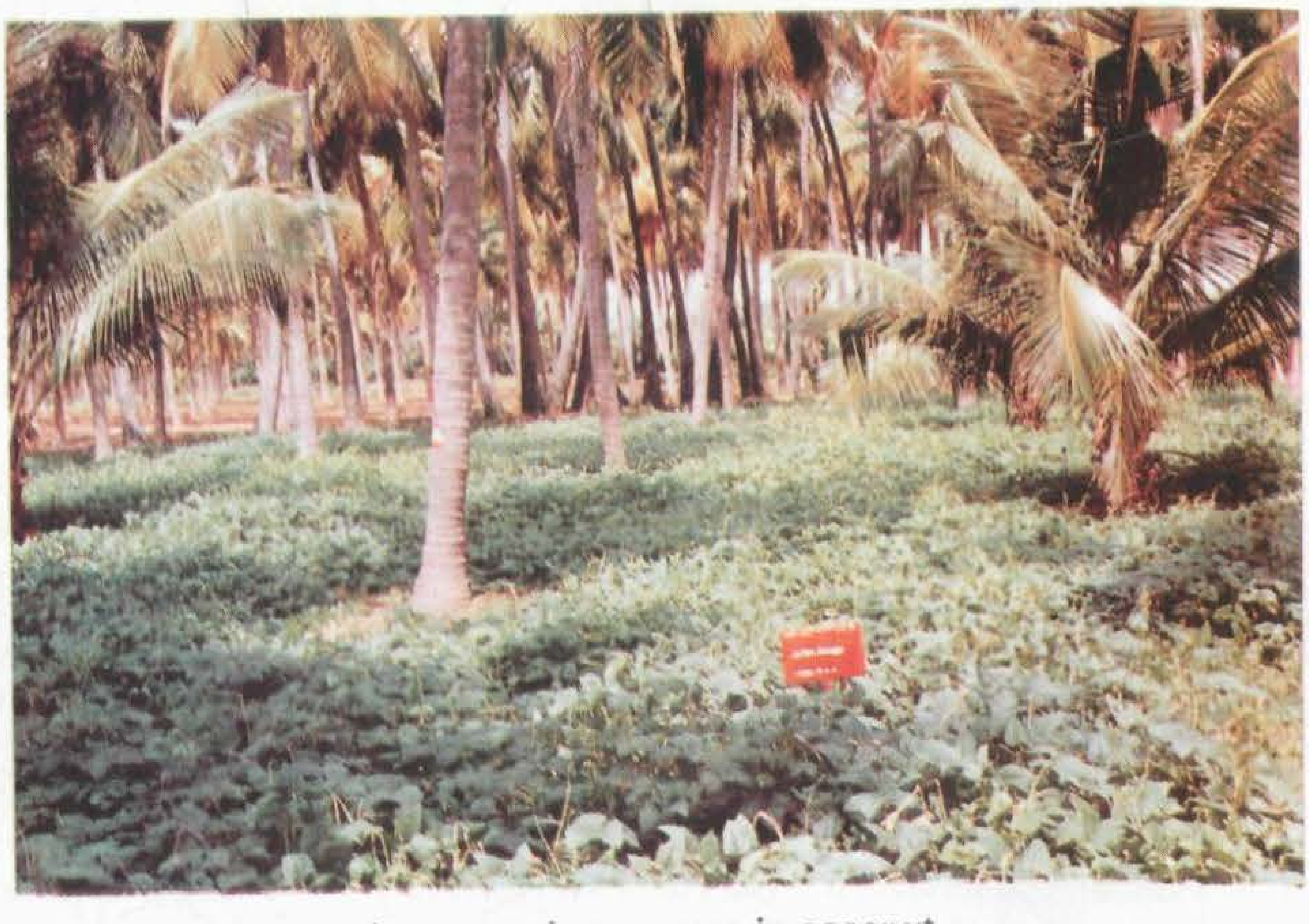
Jack - Palur 1

Tamarind - PKM 1

Rose - Yercaud 2



Gerbera - Yercaud 1



Intercropping cowpea in coconut

Mass production of the predator *Chrysoperla Carnea* Steph

5. EXTENSION EDUCATION

The Directorate of Extension Education and the various education centres of TNAU are engaged in the transfer of technology emerging from the research programmes of the University. The details regarding the extension education activities of the Directorate of Extension Education are furnished below:

Krishi Vigyan Kendras

The six Krishi Vigyan Kendras at Coimbatore, Madurai, Trichy, Vridhachalam, Kattupakkam and Pondicherry conducted on-campus and off-campus training programmes on agriculture and allied activities. About 835 training programmes were conducted and the beneficiaries included 20276 farmers, 13233 farm women, 5063 extension workers, 1712 youths and 642 other categories of personnel. In addition these centres carried out 401 method demonstrations, 21 compact block demonstrations, 76 group / village meetings, 36 farm/field days, 7 farmers' days, 421 farm advisory services and answered 1062 farmers' queries. Besides these, 123 articles were published in dailies and farm magazines, 28 radio programmes/ announcements were broadcast over All India Radio and 21 TV programmes were screened for the benefit of farming community. For reference 58 Extension Literature/Publications were brought out. Slide shows numbering 138 were screened and 65 exhibitions and 37 campaigns were organised as part of their mass media utilisation activity.

Plant Clinic Centres

The scientists of the five plant clinic centres at Vellore, Namakkal, Tirur, Killikulam and Srivilliputhur periodically visited the farmers' holdings, indentified pests and diseases problems and suggested suitable remedial measures. These clinics also organised programmes for on-farm testing of pre-release cultures of various crops, management practices and plant protection methods besides undertaking surveillance work for the purpose of forecasting the outbreak of pests and diseases. Evolving prediction formulae for important pests and diseases and conducting case studies were the other activities of the plant clinic centres. The Plant Clinic Centres carried out 128 trainings on integrated pest management and the beneficiaries were 1157 farmers, 226 farm women, 647 extension workers and 191 youths. Besides individual and group contacts, 70 skill demonstrations, 62 group/ village meetings, 5 farm/field days and 2 farmers' days were conducted. These centres also organised 497 farm advisory services, answered 657 farmers' queries,

published 40 articles in dailies and farm magazines, broadcast 53 radio programmes, released 9 publications and organised 15 slide/film shows, 7 exhibitions and 8 campaigns.

National Demonstration Scheme

The ICAR sponsored scheme functioning at Namakkal organised target oriented demonstrations both under rainfed and irrigated conditions in the farmers' holdings for proving the feasibility of achieving maximum output by following various recommended practices. It organised 29 training programmes benefiting 310 farmers, 81 farm women, 209 extension workers, 48 youths and other extension personnel. The National Demonstration Scheme also organised 59 skill demonstrations, 3 group/village meetings, 26 farm/field days besides publishing 8 articles in dailies / farm magazines, 13 radio programmes, 3 slide/film shows, 4 exhibitions and 3 campaigns / seminars. During the period under report 11 farm advisory services were rendered and 48 farm queries were answered.

Scheme for the upliftment of scheduled castes and other backward communities

The All India co-ordinated project on scheduled area research functioning at Aruppukottai was shifted to the Horticultural College and Research Institute, Periyakulam, which aims at improving the socio-economic conditions of the scheduled castes farmers besides undertaking efforts to remove the poverty among them. The scheme in being operated at the new centre with effect from 24.7.1991. The project village was identified and the scheme activities were appraised. A five member 'Farmers Council' as suggested by ICAR has been formed to locally aid the scheme activities for its useful performance. Under home science, trainings on mushroom cultivation, wheat as an ingredient in supplementary food and preparation of a new nutritious wheat-millet-pulses mix were given to SC farm women. *Demonstrations on use of hay box, Janata cooler and smokeless chulah were* conducted. Also, trainings on tailoring and bag making were conducted for the identified SC women. For improving the nutritional status of SC children the anthropometric measurements were recorded for the SC children below 5 years. Farm and home visits were made to inspect the kitchen gardens, nutrition garden etc. The other extension education activities that were carried out include six training programmes, 4 radio / TV programmes, 12 group meetings and 10 method demonstrations. Besides these 12 field trips were made for the benefit of farming community and 4 popular articles were published in dailies / farm magazines.

Communication Centre

The Communication Centre at Tamil Nadu Agricultural University Main Campus, Coimbatore disseminated the innovations of the University by various methods. They are in the form of answering 625 farmers' queries, writing 10 articles in dailies / farm magazines, 38 radio programmes, 365 TV programmes, 20 slide / film shows and 5 exhibitions. Nearly 2000 people visited the central

museum and central exhibition and they were benefited. The communication centre also conducted distant learning programmes like farm school on All India Radio and correspondence courses.

Lab to Land Programme

Under the Lab to Land programme of the ICAR 300 farm families were adopted. The six Krishi Vigyan Kendras at Coimbatore, Madurai, Trichy, Vridhachalam, Kattupakkam and Pondicherry were given 50 families each for adoption. Apart from the input support, technological guidances were also rendered on the use of improved seeds, seed treatment with Azospirillum for cereals and rhizobium for pulses, seed treatment with bavistin for cereals and pulses against seed borne diseases, use of agricultural implements, enriched farm yard manure preparation etc. To increase the income level of the adopted farm families demonstrations, field trips and trainings were given on kitchen gardening, food processing and preservation, sericulture, bee keeping and mushroom cultivation.

Distant Learning Programmes

1. Farm School on All India Radio

During the period under report four courses viz., cotton pest management, sugarcane cultivation, nursery methods for horticultural crops and new paddy cultivation were offered. The collaborative radio stations were AIR stations at Coimbatore, Pondicherry, Madurai and FEBA, Bangalore. Nearly 200 registered farmers and thousands of other farmers were benefited. The two courses namely pest control by bio-control methods and agriculture and allied activities were offered from 1.1.92 to 31.3.92. One day contact programme was conducted for the courses to give practical training on the subjects concerned by organising skill demonstrations, exhibitions, group discussions etc.

2. Correspondence courses

During the period under report eight courses on sericulture, new plant protection measures in farming, banana cultivation, forage crops, sugarcane cultivation, technologies for tree seedlings, farm forestry and mushroom cultivation were offered for which 1017 had been enrolled. A three day contact programme was arranged for the courses in flower cultivation, farm implements and machineries, sericulture, new plant protection measures, banana cultivation, forage crops and soil fertility. The registered participants were given participant certificate.

Cassette lessons

Audio cassette lessons on Azolla, paddy cultivation, and mango cultivation were prepared during the period under report. Fiftyfive recorded cassettes on

coconut cultivation, tapioca, sericulture, fruits (part I, II & III), forage crops, turmeric, mushroom, sathugudi, cardamom, pepper and sugarcane cultivation were distributed to the farming community.

Video Production Unit

The Video Production unit involved in the production of video programmes on agriculture and allied activities in addition to the programmes for telecast through Doordarshan Kendra, Madras. During the period under report 38 programmes were covered and 19 video clipets were prepared and sent to Doordarshan Kendra. Totally 13 programmes were telecast through Doordarshan Kendra. About 227 pre-recorded video progrommes were sold to Agricultural Officers and farmers. Further, video coverage was arranged during the important functions of the University.

Training Unit

The training unit of the Directorate of Extension Education conducted 36 training programmes benefiting 763 participants. The participants were extension personnel from State Departmant of Agriculture, Oilseeds, Seed Certification, TANCOF, NDDB, Sericulture, Animal Husbandry and Agro - forestry besides bank officials, administrators, defence personnel and scientists of TNAU.

Periodicals

1. TNAU Newsletter

This is a monthly journal published by the Directorate of Extension Education. Through this the latest research findings and various extension activities were highlighted regularly and sent to all the Agricultural Universities, selected research organisations, developmental departments and scientists in India and abroad. At present 350 copies are printed and distributed.

2. Valarum Velanmai

This is a Tamil monthly journal of the Directorate of Extension Education having 10,000 subscribers. Efforts are taken to increase the circulation of Valarum Velanmai by enrolling somemore life subscribers. During the period under report nearly 1000 life subscribers were enrolled. A special issue on 'Pests and Diseases' was released. It published 142 articles covering all the aspects of agricultural science.

3. TNAU Seithi Madal

This is a Tamil Monthly Newsletter disseminating the technologies in agriculture and allied subjects relevant to the season, variety and crops among the farming community and other officials of the development departments of the

State. This seithi madal also carries important aspects such as seasonal and ocation specific recommendations, new findings, forecasting of pests and diseases, climatic changes and their impact etc. and functions as an effective tool in the transfer of technology. At present 1700 copies are printed and distributed to the Convenors of the Farmers Discussion Groups of Krishi Vigyan Kendras, Farmers' Training Centres and officials of the development departments of the State.

Agricultural Information Service

The regular flow of information is ensured to the extension workers and armers through the Agricultural Information Service which is functioning at the nain campus. On all Wednesdays timely and need based messages were processed with the help of scientists and disseminated through all mass media. Besides his, this centre also issues daily press notes highlighting the ongoing activities of he University. During the period under report 7835 visitors received information rom Agricultural Information Service. Every Wednesday has been identified as he contact day for farmers. Proper/regular counselling was given to the farmers with the help of Heads of Departments and the Directors.

The messages processed and sent to various media during the period under eport are as follows :

Departments

1.	Agronomy	...	31
2.	Soil Science	...	7
3.	Agrl. Entomology	...	25
4.	Plant Pathology	...	6
5.	School of Genetics	...	3
6.	Nematology	...	2
7.	Crop Physiology	...	4
8.	Seed Technology	...	2
9.	Horticulture	...	3
0.	Agrl. Engineering	...	3
1.	Information Service	...	1
			87

Students' Counselling and Placement Centre

This was started with the objective of counselling students to channelise heir aspirations in the professions and assist them to be ideally placed in different

jobs. Students were encouraged to go for higher studies. The relevant advertisements collected from dailies / foreign correspondence / National Institutes are placed on the notice boards of concerned departments and hostels and the needful counselling on those advertisements was also given to the needy students. The service clubs of various organisations were approached for this purpose. Special lectures were also arranged to facilitate students to get a deep insight into it.

The centre is also organising coaching classes for IAS and allied services. Based on the syllabus for these competitive examinations, the resource persons from various departments are also identified.

The centre also invited potential employers to the campus for campus interview and conducted campus interviews in agriculture and allied subjects and suggested the names of potential graduates to private firms for placement. The centre had also organised skill oriented training for the unemployed farm graduates on mushroom cultivation, sericulture, mass production of banana seedlings through tissue culture, bio-fertilizer production and food processing. They were also provided with adequate technological support and reading materials.

First Line Demonstration

The First line demonstrations on oil seeds and pulses were started in 1990-91 with the grant of ICAR, New Delhi. The objective of the scheme is to establish potential of improved technology in increasing the productivity of oilseeds and pulses through profitable input management, timely operation, reducing harvesting and post harvesting losses and human drudgery in agricultural operation. The demonstration will be carried out for a period of two years with the same farmers. The demonstrations were organised for the oilseed crops like groundnut, sesamum, sunflower, soybean and pulses in a block of 5 ha area.

Other Activities

Women in Agriculture Day

Women in Agriculture Day was celebrated by all the 6 Krishi Vigyan Kendras of this Directorate. Nearly 850 farm women were benefited. Demonstrations on seed treatment, mushroom cultivation, coconut planting, farm implements, animal husbandry, activated clay treatment, detergent making and pickle making were organised exclusively for farm women.

World Food Day

World Food Day was celebrated on 16.10.1991 by all TOT Centres of this Directorate. Campaigns, seminars, skill demonstrations and group discussions in latest technologies were conducted and also the ways and means for food production were emphasised.

Table I. Number of Trainings conducted

Sl. No.	Centre	No. of trainings	Beneficiaries (Number)				
			Farmers	Farm women	Extension workers	Youths	Others
1.	KVK, Coimbatore	152	3400	7141	980	398	—
2.	KVK, Madurai	110	3398	998	588	—	—
3.	KVK, Trichy	106	3799	2386	1021	175	340
4.	KVK, Vridhachalam	174	5719	1171	1202	471	37
5.	KVK, Kattupakkam	201	3863	1048	340	394	—
6.	KVK, Pondicherry	82	97	489	932	274	265
7.	PCC, Vellore	13	4	2	5	1	1
8.	PCC, Namakkal	30	121	19	110	—	—
9.	PCC, Tirur	3	16	2	8	—	—
10.	PCC, Killikulam	40	450	160	320	100	—
11.	PCC, Srivilliputhur	42	566	43	204	90	—
12.	SCOBC Scheme, Periyakulam	6	10	60	—	40	—
13.	National Demonstration Scheme	29	310	81	209	48	5

Table II. Individual / Group contact

S. No.	Centre	Demonstration		Village meetings	Farm / field days	Farmers Day	Farm Advisory services	Queries answered
		method	Compact block					
1.	KVK, Coimbatore	162	—	31	20	1	105	560
2.	KVK, Madurai	46	—	—	3	1	64	144
3.	KVK, Trichy	73	6	—	5	—	60	78
4.	KVK, Vridhachalam	9	13	5	5	1	52	129
5.	KVK, Kattupakkam	65	—	12	3	1	89	102
6.	KVK, Pondicherry	46	2	28	—	3	51	49
7.	PCC, Vellore	23	—	7	—	—	78	100
8.	PCC, Namakkal	7	—	7	—	—	84	59
9.	PCC, Tirur	5	—	1	—	—	49	20
10.	PCC, Killikulam	35	—	38	2	1	251	265
11.	PCC, Srivilliputhur	—	—	9	3	1	35	212
12.	SCOBC Scheme, Periyakulam	10	—	12	—	—	—	—
13.	NDS, Namakkal	59	—	3	26	—	11	48
14.	Communication Centre	—	—	—	—	—	—	625

Table III. Mass Media Utilisation Programme

Sl. No.	Centre	Writing to Dailies&Farm Magazines	Radio programme	TV programme	Publication brought out	Slide / film shows	Exhibition	Campaign / Seminars
1.	KVK, Coimbatore	27	11	3	6	19	24	8
2.	KVK, Madurai	15	6	—	11	16	9	5
3.	KVK, Trichy	13	12	2	9	5	2	—
4.	KVK, Vridhachalam	8	13	1	21	20	13	4
5.	KVK, Kattupakkam	42	10	15	8	62	12	12
6.	KVK, Pondicherry	18	6	--	3	16	5	8
7.	PCC, Vellore	3	5	1	—	3	—	—
8.	PCC, Namakkal	5	6	-	5	3	-	3
9.	PCC, Tirur	5	2	1	—	3	—	—
10.	PCC, Killikulam	12	30	—	—	5	2	2
11.	PCC, Srivilliputhur	15	10	—	3	2	5	3
12.	SCOBC Scheme, Periyakulam	—	4	—	—	—	—	2
13.	National Demonstration, Namakkal	8	13	—	2	3	4	2
14.	Communication Centre, Coimbatore	10	38	65	5	20	5	—

Farmers' Day at main campus, Coimbatore - Hon'ble Minister for Agriculture and Pro - Chancellor releases the new crop varieties

Farmers and farm implements entrepreneur's day at TRRI, Aduthurai

Hon'ble Minister for Agriculture and Pro-Chancellor distributing farm implements at FC & RI, Mettupalayam

Field demonstration of biological control of pests and diseases at RRS, Vridhachalam

Field visit by IDRC trainees. RRS, Vridhachalam

Inauguration of training programme on Agro - forestry

APPENDIX - I

IMPORTANT CIVIL WORKS COMPLETED

1991 - 92

1. I Floor over computer room, Coimbatore
2. Vehicle shed, Coimbatore
3. Staff quarters, Madurai
4. Farmers' hostel over the existing training hall, **Madurai**
5. Seed store cum processing shed, Periyakulam
6. Vehicle shed, Periyakulam
7. Staff room, Periyakulam
8. Cattle shed, Aliyarnagar
9. Cattle shed and vehicle shed, Ambasamudram

0. Office cum laboratory building, Melalathur

1. Staff quarters, Pattukottai

2. Staff quarters, Thadiyankudisai

3. Laboratory cum office building, Tirur

4. Laboratory building, Veppankulam

5. Staff quarters, Veppankulam

APPENDIX - II

LIST OF SCHEMES

University Research Schemes - Plan

		1991 - 92 Revised Estimate (Rs. in Lakhs)
1.	Scheme for starting post-graduate diploma in Plant Protection, Coimbatore	3.97
2.	Scheme for research on development of forage crops, Coimbatore	0.99
3.	Scheme for the establishment of an advance centre for soil and crop management studies, Coimbatore	2.41
4.	Scheme for strengthening of training division in the Directorate of Extension Education, Coimbatore	1.05
5.	Scheme for strengthening of Estate Office, Coimbatore	3.09
6.	Scheme for starting of M.E. (Ag.) in Post-harvest Technology, Coimbatore	0.20
7.	Scheme for strengthening of Radiation Research, Coimbatore	2.02
8.	Scheme for strengthening the Directorate of Research, Coimbatore	4.07
9.	Fortification of Inbred lines of sorghum with genes for high combining ability and downy mildew resistance, Coimbatore	2.28
0.	Micro-propagation of horticultural crops, Coimbatore	0.85
1.	Development of suitable strains of *Azospirillum* for commercial crops, Coimbatore	1.31
2.	Creation of new Department of Bio-Technology, Coimbatore	2.79
3.	Exploitation of hybrid vigour and development of superior hybrids in redgram, Coimbatore	1.28
4.	Biological control of soil brone plant pathogens, Coimbatore	0.84
5.	Studies on the role of VA-Mycorrhizal fungus in the establishment of P-Nutrition of Agricultural and Plantation Crops, Coimbatore	0.30
6.	Establishment of Video-Library, Coimbatore	1.21
7.	Water Technology Centre, Coimbatore	18.10

18.	Starting of post-graduate programme leading to M.B.M., Coimbatore	3.36
19.	Mitochondrial DNA and proteins in cytoplasmic male steriles in So:ghum, Coimbatore	0.87
20.	Development of monoclonal antibodies for RTV in rice and CMV and BTV in banana, Coimbatore	1.48
21.	Studies on behavioural control of Polyphagous Lepidopteran pests, Coimbatore	1.25
22	Scheme for the selection of grape cultivars for drought and salt tolerance and standardisation of agro-technique, Coimbatore	0.08
23.	Scheme for the establishment of a Centre for Sericulture, Coimbatore	3.60
24.	Scheme for strengthening post-graduate teaching and research in agricultural marketing management, Coimbatore	1.97
25.	Scheme for establishment of an Advance Centre for studies on Plant Protection, Coimbatore	3.44
26.	Management of virus diseases of horticultural crops, Coimbatore	1.14
27.	Remote Sensing Unit-Agricultural Applications, Coimbatore	4.19
28.	Faculty of Forestry, Coimbatore	5.86
29.	Strengthening foliar diagnosis research to alleviate nutritional and physiological disorders in crop plants, Periyakulam	1.80
30.	Studies on the improvement and management of sweet oranges, Periyakulam	0 80
31.	Studies on the decline in the yield of grape, banana, tomato and brinjal due to nematode and fungus complex, Periyakulam	2.54
32.	Horticultural College and Research Institute, Periyakulam	
33.	Agricultural College and Research Institute, Kumulur	64.05
34.	Survey and management of pests of forests and forage trees, Mettupalayam	0.96
35.	Tissue culture technique for forest trees, Mettupalayam	1.55
37.	Forestry College and Research Institute, Mettupalayam	0.50
38.	Agricultural College and Research Institute, Killikulam	1.89
39.	Research on dry land horticultural crops in red soil tract, Killikulam	1.89
40.	Establishment of Seed Technology Unit, Killikulam	2.75
41.	Scheme for strengthening and coordinating rice virus disease and mycoplasma diseases, Madurai	2.33
42.	Scheme for development of Seed Technology Unit, Madurai	2.45
43.	Establishment of Centre for Nematode Pests of Crop Plants, Madurai	1.89

44.	Scheme for improvement of minor pulses, Madurai	2.72
45.	Scheme for improvement of minor tuber crops, Madurai	0.50
46.	Studies on processing technology for soya based foods, Madurai	1.01
47.	Teaching science and technology to farm women through video cassettes, Madurai	1.10
48.	Scheme for strengthening and coordinating rice entomological research, Madurai	3.30
49.	Scheme for strengthening of research on chemistry of submerged soil, Aduthurai	1.04
50.	Scheme for the production of Breeder Seed in Paddy, Aduthurai	3.12
51.	Scheme for commercial exploitation of heterosis in rice, Aduthurai	1.09
52.	Evaluation of scented and non-scented rices, Aduthurai	0.84
53.	Scheme for the establishment of Regional Research Station, Aruppukottai	9.48
54.	Scheme for upgradation of Tamil Nadu Rice Research Institute and Reorganisation of the set up of Directorate of Research, Aduthurai	3.01
55.	Studies on seed crop management practices under dryland conditions, Aruppukottai	0.73
56.	Scheme for breeder seed increase, Bhavanisagar	4.64
57.	Establishment of a seed complex including seed health testing and training, Bhavanisagar, Mettupalayam	2.26
58.	Scheme for upgrading the Sugarcane Research Station, Cuddalore	4.46
59.	Technology development of wasteland reclamation in coastal area, Cuddalore	3.18
60.	Evolving new varieties and technology for higher productivity in *Casuarina*, Cuddalore	1.55
61.	Establishment of laboratory for survey and research on Golden Nematodes of Potatoes, Vijayanagaram, Uthagamandalam	3.30
62.	Scheme for investigation on the management of pests and diseases of hill fruit and vegetable crops of the Nilgiris, Uthagamandalam	2.04
63.	Studies on drought climatology, Trichirapalli	0.79
64.	Sub-project for strengthening the Horticultural Research Station, Thadiyankudisai	7.87
65.	Scheme for improvement of groundnut suitable for rainfed areas, Tindivanam	1.21
66.	Operational research on pests and diseases management in rice, Kattuthottam, Thanjavur	---

67.	Bio-fertilizer research on forest system in Western Ghats, Kodaikanal	0.94
68.	Scheme for evaluation of medium staple cotton for black soil rainfed areas of southern districts, Kovilpatti	1.09
69.	Scheme for Development of Breeder Seeds in Millets, Kovilpatti	2.36
70.	Scheme for studies on wilt and button shedding in coconut, Nagercoil	2.11
71.	Scheme for vegetable seed production, Palur	2.33
72.	Scheme for improvement of brinjal varieties for North and Western Regions of Tamilnadu, Palur	1.23
73.	Scheme for the improvement of chillies in southern districts of Tamil Nadu, Paramakudi	2.99
74.	Seed production practices in upland rice, Paramakudi	1.04
75.	Mass production and quality control of bio-fertilizers, Paiyur	0.63
76.	Scheme for formulation of improved agro-techniques in grapes suitable for Dharmapuri, Paiyur	1.39
77.	Sub-project for strengthening the Regional Research Station, Paiyur	7.54
78.	Scheme for strengthening of seed production programme, Pattukottai	0.75
79.	NARP Sub-project at Thirupathisaram	1.65
80.	Banana Research Station, Virinjipuram, Vellore	5.24
81.	Scheme for the Establishment of Agricultural Research Station, Vellore	4.28
82.	Development of sorghum varieties for various industrial purposes, Vellore	1.59
83.	Causes for button shedding, nut shrinking and ill filling in coconut, Veppankulam	0.92
84.	Scheme for strengthening of coconut research in Thanjavur district Veppankulam	3.09
85.	National Pulses Research Centre, Vamban	5.48
86.	Scheme for breeder seed production in groundnut, Vamban	1.63
87.	Scheme for strengthening of breeding work in Pulses, Pudukottai (Vamban)	1.36
88.	Scheme for research on temperate vegetables at Vijayanagaram, Kodaikanal and Thadiankudisai	2.50
89.	Scheme for strengthening Plant Clinic Centres at Vellore, Tirur, Killikulam, Srivilliputhur and Namakkal	8.58
90.	Scheme for research on improvement of cultivation of Palmyrah Palm, Srivilliputhur, Killikulam	4.31

91.	Scheme for research on intensification of medium staple cotton, Srivilliputhur, Paiyur, Kovilpatti and Aduthurai	4.52
92.	Scheme for research on introduction of new tree species, Coimbatore, Mettupalayam, Vamban and Tirunelveli	2.11
93.	Scheme for popularisation of agricultural implements through Krishi Vigyan Kendras, Coimbatore and Madurai	1.84
94.	Scheme for improvement of forage grasses and legumes and pasture development, Aruppukottai, Erode and Paiyur	2.67
95.	Scheme for seed production and seed storage studies on sub-tropical and temperate crops, Periyakulam (Kodaikanal and Thadiyankudlsai sub-centres)	1.74
96.	Scheme for research on oil bearing tree crops and sylvagronomical studies on energy fuel yielding wood lot, Aruppukottai and Mettupalayam	1.47
97.	Scheme for strengthening of breeder seed programme at Vridhachalam, Tindivanam and Kattupakkam	7.09
98.	Scheme for multiplication and distribution of pulses, Vamban, Tindivanam, Coimbatore	7.79
99.	National Agricultural Research Project, Cauvery Delta Zone, Aduthurai and Trichirapalli	11.26
100.	Sub-project for strengthening Regional Research Station, Vridhachalam, Cuddalore, Tindivanam and Kattupakkam	7.00
101.	Sub-project for strengthening Regional Research Station, Aruppukottai, Srivilliputhur and Pudukottai	17.42
102.	Scheme for Establishment of Regional Laboratory at Trichirapalli, Paiyur and Yercaud	6.59
103.	Krishi Vigyan Kendras, Coimbatore and Madurai	12.86
104.	Scheme for starting bio-fertilizer production and quality control unit, Coimbatore and Madurai	2.68
105.	Scheme for the development of sugarcane at Madurai (Sirugamani) and Melalathur	1.62
106.	Development of extra early rice variety, Aduthurai	0.63
107.	Evolving chilli varieties resistant to mosaic and thrips, Killikulam	0.70
108.	Programming for diversified production activities for dryland and wasteland, Pudukottai	0.70
109.	Creation of a new department of bio-energy, Coimbatore	3.13
110.	Molecular diagnosis kit for early detection of bunchy top of banana, Thadiyankudisai	1.25

111.	Evaluation of greengram and redgram genotypes for table purpose, Vamban	
112.	Setting up a pilot plant for fruits and vegetable based processing industry, Periyakulam	0.50
113.	Management practices for bamboo under irrigated conditions, Mettupalayam	1.80
114.	Tree improvement in exotic species for wood based industries, Mettupalayam	0.65
115.	Rice technology development, management and utilisation - A farming system approach, Aduthurai	1.60
116.	Development of varieties resistant to rice blast, sheath rot and ragi blast using tissue culture, Coimbatore	2.20
117.	Development of pheromones for major pests of rice and cotton, Coimbotore	1.51
118.	Season specific seed production technology for the development of seed districts in generating quality seed for yield maximisation, Aduthurai	1.20
119.	Scheme for exploitation of male sterile lines for developing hybrid cotton, Coimbatore	1.60
120.	Agro-forestry system for sloppy lands, Uthagamandalam	0.48
121.	On-farm trials on improved technologies developed for the crops grown in Salem and Dharmapuri districts	0.75
122.	Variety Release Award - Creation of an Endowment	2.20
		1.00

Non Plan Schemes

1.	Scheme for improvement of sunflower in Tamilnadu, Kovilpatti	
2.	Scheme for coordinated agronomic experiments on sugarcane, Cuddalore	2.85
3.	Scheme for research on nematode parasites of sugarcane crop, Cuddalore	4.98
4.	Scheme for biological testing of pesticides laboratory, Vamban, Kovilpatti, Aduthurai and Tindivanam	2.47
5.	Scheme for improvement of groundnut through induction of mutation, Coimbatore	6.10
6.	Scheme for surveillance of pest and diseases, Vellore	1.28
7.	Scheme for studies on the residues of pesticides in plant and soil, Coimbatore	2.93
8.	Scheme for research on citrus - dieback [illegible]	3.31

111.	Evaluation of greengram and redgram genotypes for table purpose, Vamban	0.50
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6.	Scheme for surveillance of pest and diseases, Vellore	2.93
7.	Scheme for studies on the residues of pesticides in plant and soil, Coimbatore	3.31
8.	Scheme for research on citrus - dieback, Killikulam and Coimbatore	1.53

Scheme for improvement of redgram and soybean, Vamban	2.85
Scheme for evolution of cumbu resistant to greenear and ergot diseases, Vamban, Kovilpatti	4.06
Scheme for intensification of pulses research, Vamban	1.44
Scheme for maximisation of pulses production, Vamban	1.05
Scheme for improvement of millets for grain and fodder, Kovilpatti	2.64
Scheme for improvement of wetland pulses, Aduthurai	3.62
Scheme for Coordinated Agronomic Experiments on Sugarcane, Trichy	5.30
Agricultural Research Station, Ramanathapuram	1.00

ICAR Coordinated Research Schemes (Party Financed)

1.	All India Coordinated Research Project on Agronomic Research, Coimbatore, Tanjore, Periyakulam, Ramanathapuram, Vellore	11.48
2.	All India Coordinated Research Project on Water Management, Bhavanisagar, Madurai	13.04
3.	All India Coordinated Research Project on Dryland Agriculture, Kovilpatti	5.55
4.	All India Coordinated Research Project on Agro-Meteorology, Kovilpatti	1.74
5.	All India Coordinated Research Project on under utilised / under exploited plants, Mettupalayam	2.21
6.	All India Coordinatee Research Project on Sugarcane, Cuddalore	0.84
7.	All India Coordinated Research Project on Improvement of soil physical conditions to increase agricultural production of problematic areas, Coimbatore	3.51
8.	All India Coordinated Research Project on micro and secondary nutrient and pollutant elements in soil and plants, Coimbatore	3.89
9.	All India Coordinated Research Project on longterm fertilizer experiment, Coimbatore	1.07
10.	All India Coordinated Research Project on investigation on correlation of soil test with crop response, Coimbatore	3.24
11.	All India Coordinated Research Project on Oilseeds, Coimbatore, Vridhachalam, Aliyarnagar, Tindivanam and Bhavanisagar	17.51
12.	All India Coordinated Research Project on Jute and Allied Fibres, Coimbatore	1.39
13.	All India Coordinated Research Project on Rice Improvement, Coimbatore, Aduthurai and Madurai	10.44
14.	All India Coordinated Research Project on Sorghum, Coimbatore	6.60

15.	All India Coordinated Research Project on Forage crops, Coimbatore	5.23
16.	All India Coordinated Research Project on Cotton, Coimbatore, Kovilpatti and Srivilliputhur	12.93
17.	All India Coordinated Research Project on Intensification of Research on the Improvement of Pulses, Coimbatore, Vamban	11.86
18.	All India Coordinated Research Project on Palm, Aliyarnagar, Aduthurai	4.08
19.	All India Coordinated Research Project on Maize, Coimbatore	1.92
20.	All India Coordinated Research Project on Small Millets, Coimbatore	4.79
21.	All India Coordinated Research Project on Acarology, Coimbatore	1.34
22.	All India Coordinated Research Project on Pesticides Residues, Coimbatore	3.19
23.	All India Coordinated Research Project on plant parasitic nematodes with integrated approach for their control, Coimbatore	2.54
24.	All India Coordinated Research Project on biological control of crop pests and weeds, Coimbatore	1.59
25.	All India Coordinated Research Project on seed borne disease, Coimbatore	1.19
26.	All India Coordinated Research Project on Mushrooms, Coimbatore	2.16
27.	All India Coordinated Research Project on Betelvine wilt disease, Sirugamani	2.09
28.	All India Coordinated Research Project on Weed control, Coimbatore	3.61
29.	All India Coordinated Research Project on spices and plantation crops, Coimbatore, Yercaud	4.56
30.	All India Coordinated Research Project on Palm (Coconut), Veppankulam	5.74
31.	All India Coordinated Research Project on vegetables including chillies, Coimbatore	3.51
32.	All India Coordinated Research Project on Cashew, Vridhachalam	2.78
33.	All India Coordinated Research Project on post-harvest technology in horticultural crops, Periyakulam	3.41
34.	All India Coordinated Research Project on Floriculture, Coimbatore	2 30
35.	All India Coordinated Research Ptoject on Tuber Crops other than potatoes, Coimbatore	2.73
36.	All India Coordinated Research Project on Tropical fruits, Periyakulam, Coimbatore	8.91
37.	All India Coordinated Research Project on arid fruits, Aruppukottai	2.80

38.	All India Coordinated Research Project on renewable energy sources, Coimbatore	8.67
39.	All India Coordinated Research Project on *farm implements* and machinery, Coimbatore	13.96
40.	All India Coordinated Research Project on energy requirement in agricultural sector, Coimbatore	6.07
41.	All India Coordinated Research Project on intensive testing of power tiller and research and development of new machine to make them versatile, Coimbatore	2.81
42.	All India Coordinated Research Project on post harvest technology, Coimbatore	4.48
43.	All India Coordinated Research Project on Biological nitrogen fixation, Coimbatore	2.04
44.	All India Coordinated Research Project on Agro-forestry, Mettupalayam	2.34
45.	All India Coordinated Research Project on Soybean, Coimbatore	1.33

ICAR - Fully Financed Schemes

1.	All India Coordinated Research Project on National Demonstration on major food crops, Namakkal	1.54
2.	Krishi Vigyan Kendra, Pondicherry, Kattupakkam, Vridhachalam and Trichi	23.30
3.	Lab to Land Programme - Programme for Transfer of Technology to families, Coimbatore, Madurai, Pondicherry, Trichirapalli, Kattupakkam and Vridhachalam	1.77
4.	All India Coordinated Research Project on Rapid Improvement of Agricultural Technology directed at socio-economic upliftment, Periyakulam	2.35
5.	National Seed Project - Breeders Seed Production, Bhavanisagar and Periyakulam	6.84
6.	All India Coordinated Research Project on Pearl Millet Improvement, Coimbatore	1.98
7.	Studying the impact of modernisation in agriculture in farm women with reference to rice-farming in the country, Coimbatore	
8.	*Capital requirment* for modernisation of Indian Agriculture, Coimbatore	0.90
9.	Isolation and identification of antiviral principle in plant extracts and preparation of effective antiviral formulation, Coimbatore	0.48

10.	Scheme for Investigation on host-plant resistance and cultural methods of control (potato cyst nematodes scheme), Uthagamandalam	1.98
11.	Development of homozygous dihaploid lines from Indica x Japonica hybrids through androgenesis in rice, Coimbatore	0.52
12.	Evaluation of high yielding fodder type in small millets, Coimbatore	0.46
13.	Project for breeder seeds of Annual Oilseeds Crops, Bhavanisagar and Vridhachalam	9.18
14.	Studies on the selection of saline and acid tolerant blue green algae and nitrogen fixation in rice soil eco-system, Coimbatore	0.46
15.	Scheme for development of methods for management of virus diseases of greengram and blackgram, Coimbatore	1.19
16.	Isolation and characterization of microbial products involved in stable soil aggregation, Coimbatore	0.66
17.	Adaptive Research on Sugarcane, Cuddalore	11.48
18.	Diversification of male sterile lines in pearl millet, Coimbatore	1.23
19.	Frontline Demonstration in Oilseeds, Coimbatore, Bhavanisagar, Aliyarnagar, Vridhachalam and Tindivanam	
20.	Scheme for the promotion of research and development efforts on hybrids in selected crops, Coimbatore, Bhavanisagar and Tindivanam	31.00
21.	Agro-techniques for maximising yield in chewing tobacco in Western Zone of Tamil Nadu, Bhavanisagar	1.02
22.	Biological control of a few major insect pests associated with sugarcane, coconut, banana and mango crops by using entomophilic nematodes, Madurai	0.53
23.	Alternative model for T & V System, Coimbatore	1.68
24.	Methodology for early detection of Thanjavur wilt of coconut, Veppankulam	0.99
25.	In vitro culture studies for the improvement of banana clones, Periyakulam	0.46
26.	First line demonstrations on oilseees crops (Kharif, summer and Rabi) through Krishi Vigyan Kendras at Coimbatore, Madurai, Tiruchirapalli, Kattupakkam and Vridhachalam	6.00
27.	Scheme for production of breeder seeds of annual Kharif / Rabi Oilseeds Crops, Bhavanisagar and Vridhachalam	0.83
28.	All India Coordinated Rice Improvement Project, Pondicherry	2.32
29.	Studies on seed collection, processing and standardisation of storage practices in sylvicultural crops of economic importance, Mettupalayam	1:14

30.	Land to Lab programme, Coimbatore	0.05
31.	First line demonstration on pulses, Rabi / Summer crop Black gram and Green gram, Vamban and Thanjavur	1.14
32.	Front line demonstration on oilseeds component-D-Demonstrations on efficiency of Rhizobium inoculation on oilseeds under the All India Coordinated Research Project on BNF, Coimbatore	0.31
33.	Front line demonstrations on oilseeds, sub-component-D-Demonstration of improved package of practices for oilseeds with emphasis on balanced fertilisation through soil testing, Coimbatore	0.18
34.	Scheme for multilocation trial in sunflower (oilseeds), Coimbatore	0.05
35.	Front line demonstration for oilseeds, sunflower hybrids, Bhavanisagar	
36.	Scheme for demonstration and popularisation of improved implements and machinery through Krishi Vigyan Kendra, Pondicherry	3.01
37.	Front line demonstrations on Production Potentials of Oilseeds Crops-Soybean, Coimbatore	0.82
38.	Front line demonstrations on oilseeds, sub-component D Demonstrations of inter-cropping / sequence cropping systems involving oilseed crops under rainfed conditions, Kovilpatti	0.24
39.	Front line demonstration on oilseeds, sub-component cropping systems research, demonstrations on production potential at ECF Centres, Periyakulam and Vellore	
40.	Front line demonstration in sunflower (Oilseeds), Coimbatore	0.36
41.	Stand Alone Fuel Cell Power Plants for Rural Electrification in India, College of Agrl. Engineering, Coimbatore	0.18
42.	Front line demonstrations on pulses under National Pulses Development Project (NPDP), Coimbatore and Vamban	0.84
43.	Front line Demonstrations on Oilseeds, Popularisation of Oilseeds Implements and Machinery, Coimbatore	
44.	Studies on the genetic manipulation of algal symbiont *Anabaena Azollae* and induction of sporulation process in Azolla.	

NARP Phase II Sub-Projects

I. North Eastern Zone

1.	Vellore	61.58
2.	Kattupakkam	17.32

II. North Western Zone		
	3. Paiyur	19.38
	4. Pottaneri	23.44
	5. Namakkal	28.33
III. Cauvery Delta Zone		
	6. Aduthurai	22.13
	7. Trichy	2.48
	8. Kattuthottam	25.68
	9. Sirugamani	36.20
IV. Western Zone		
	10. Bhavanisagar	24.64
	11. Mettupalayam	55.35
V. Southern Zone		
	12. Periyakulam	45.32
	13. Aruppukottai	19.50
	14. Pudukkottai	18.96
	15. Srivilliputhur	7.90
	16. Killikulam	7.94
VI. Hilly and Tribal Zone		
	17. Yercaud	43.42
	18. Vijayanagaram	23.02
	19. Sandynallah	4.24
VII. High Rainfall Zone		
	20. Pechiparai	66.74
	21. Thirupathisaram	21.21

Government of India Schemes

1.	DNES - Regional biogas training and development centre, Coimbatore	6.42
2.	DNES - Scheme for establishment of regional centre for fuel efficient stove technology (Technical backup support unit of National Programme on improved Chulas), Coimbatore	3.30
3.	DNES - Test kit for fermentative and methanogenic anaerobes, Coimbatore	1.42

4.	DNES - Microbiology of methane production from cattle dung, *human waste, piggery waste and sago industry effluent, Coimbatore*	3.37
5.	DNES - Degradation of fatty acids by syntrophic coculture in biogas digestors, Coimbatore	5.47
6.	DNES - Scheme for characterisation of translucent prefab dome of fixed dome biogas plants in relation to selective electro-magnetic wavelength filtering and resulting response *microbes in general and methanogens in particular, Coimbatore*	3.00
7.	DBT - Production of coconut plants through tissue culture techiques, Coimbatore	
8.	DBT - Postgraduate education and training programme leading to M.Sc. degree in agriculture bio-technology under DBT Postgraduate Programme, Coimbatore	6.50
9.	DBT-Establishment of user centre at Tamil Nadu Agricultural University, Coimbatore under Bio-technology Information System, (BTIS) A national infrastructural facility, Bio-technology Unit, Coimbatore	11.34
10.	DBT-Biological control of insect pests through bio-technology, Coimbatore	4.39
11.	DBT-Biological control of root rot diseases of pulses and oil seeds and mass multiplication of antagonists, Coimbatore	2.75
12.	DBT-Establishment of pilot plants for mass products of *Trichogramma* and *Chrisopa* and field studies with genetically improved strains, Coimbatore	4.20
13.	Establishment of Centre for Plant Molecular Biology (CPMB), Coimbatore	41.57
14.	DBT-Scheme on the technology development and demonstration project on bio-fertilizers (BGA), blue green algae, Aduthurai	17.26
15.	DBT-Selection and cloning of hyper ligninolytic *Streptomyces* sp. for conversion of lignin rich waste (coir dust) to energy chemicals and humus like poly-condensates, Coimbatore	6.10
16.	ICFRE - Scheme for increasing the biomass of forest tree species by the use of mycorrhizal fungi, Uthagamandalam	0.52
17.	ICFRE-Chemical constituents of Neem and Karanja (Pungam) kernel, Mettupalayam	0.76
18.	Exploitation of symbiotic nitrogen fixation of actinorrhizal plants for afforestation and soil rehabiliation, Coimbatore	2.44
19.	Comprehensive scheme for estimating cost of production of principal crops, Coimbatore	31.80
20.	Scheme for Rice Processing and Allied Equipments, Coimbatore	3.00

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21.	Plasticultural application and development in agricultural operation, Coimbatore	1.69
22.	Establishment of an advanced centre of training in water management technology at water technology centre, Coimbatore	2.21
23.	Environment protection by developing relation between vegetation stream flow and ground water in Kodaikanal, Coimbatore	0.81
24.	Nitrogen fixation and carbon assimilation in stem nodules of *Sesbania rostrata*, Coimbatore	0.69
25.	Technology extension project on agro-forestry in farmers field, Mettupalayam	0.16
26.	Central sector scheme for integrated programm for the development of spices. Scheme for production of foundation seed of Chillies and Minor Spices, Bhavanisagar	2.17
27.	Central sector scheme-Production of fruits and vegetables, Coimbatore. Palur, Periyakulam	5.00
28.	Indo-US-seminar scientific panel programme, Internal Review meeting workshop, Coimbatore	0.78

International Collaborative Schemes

1.	Scheme for Sesamum Research, Coimbatore	0.63
2.	Scheme for Sesamum Research, Vridhachalam	2.60
3.	International courses of sesame production and protection, Vridhachalam	0.79
4.	Oilseeds technology transfer package through mass campaign, video teaching, demonstration and small group approach, Coimbatore	7.28
5.	To test rice genotypes under low fertility conditions in different rice growing conditions of South and South East Asia, Coimbatore	0.70
6.	Project on botanical pest control, Phase-II, Coimbatore, Aduthurai and Madurai	3.00
7.	Collaborative project on constraints to higher rice yield in different rice production environments and prioritisation of rice research in Southern India, Coimbatore	4.50
8.	Net work collaborative research on green manure development and utilisation for rice based cropping systems, Coimbatore	1.50
9.	Research project in collaboration with IFPRI-Transfer of agricultural technology and dynamics of information flows within the technology sector, Coimbatore	0.01
10.	Rural infrastructure and agricultural growth, Coimbatore	0.44

11.	Response of major surface irrigation system to drought, Coimbatore	1.00
12.	Modelling in irrigation investment, Coimbatore	1.00
13.	Management of small scale irrigation systems and ground water under constraints, Coimbatore	1.13
14.	Development and use of indigenous microbial pathogens for the control of *Heliothis armigera* and *Spodoptera litura* in different cropping systems in South India, Coimbatore	7.00
15.	Studies on the utilisation of domestic and urban sewage and sludge and industrial waste for increasing crop production, Coimbatore	3.23
16.	Project for standardisation of seed production, processing and storage technology for tree crops, Coimbatore	14.99
17.	Constraints to higher rice yield in different rice growing regions in Tamil Nadu, Coimbatore	10.25
18.	Search for rice sheath blight resistance, Coimbatore	3.32
19.	Rice biotechnology programme consisting of four sub projects, Coimbatore	15.03
20.	Communication net work on scarce water management, Coimbatore	0.35
21.	Collaborative research project on improvement and utilisation of *Casuarina frankia* mycorrhizal symbiosis for afforestation and agro-forestry in India in the field of Science and Technology, Mettupalayam	8.37

Private Agency Schemes

1.	Scheme for strengthening coffee teaching and training for the undergraduate and postgraduate degree courses in Horticulture, Yercaud	1.53
2.	Scheme for institution of professorial chair in Agricultural Marketing, Dept. of Agrl. Economics, Coimbatore	1.30
3.	Scheme on utilisatian of coir-pith as manure in agricultural farms - Madurai	1.85
4.	Establishment of a Chair of Professor of Agronomy for Research on Fertiliser use and Management, Coimbatore	0.89
5.	Research projects for maximisation of yield in rice, Coimbatore	0.75
6.	Establishment of a Chair of a Professor of Agricultural Entomology in Pesticide Toxicology, Coimbatore	1.10
7.	Studies on the multi-residues of pesticides in spices, Coimbatore and Uthagamandalam	0.59

8.	Investigation on soil and water resources for maximising sugarcane production in Sivaganga unit area of Sakthi Sugars Ltd., Madurai	1.32
9.	Studies on the effect of alcohol distillery effluent on soil fertility status, yield and quality of crop produce, Coimbatore	1.91
10.	Time bound project in rural development-Participation of Rural Women in Development and Economics of small scale fishing development activities, Madurai	1.66
11.	*Seed fortification and mid storage treatment for prolonging* shelf life of crops, Coimbatore	0.69
12.	Social forestry education through awareness campaigns-Video Teaching and Direct Training to farm women and youth, Coimbatore	2.09
13.	Extension of Agro-climatic Regional Exercise to district level in Tamil Nadu, Coimbatore	1.55
14.	Transfer of bio-fertilizer technology of tree crops of social forestry programme for waste iand improvement in certain selected areas of Tamil Nadu, Mettupalayam and Paiyur	2.50
15.	Developing *Azospirillium* and *Azotobacter* bio-fertilizer for mulberry, Paiyur	2.26
16.	Investigation on the quantitative and qualitative increase in the yield of mulberry through mycorrihizal inoculation, Paiyur	2.22
17.	Research proposal on investigation on the Polyhedrosis virus diseases in *Bombyx mori* and their management, Coimbatore	1.56
18.	*Studies on foliar application of micronutrients to mulberry and its* effect on economic characters of silkworm *Bombyx mori*, Coimbatore	1.56
19.	*Collaborative* research project on tapioca, Palur	0.76
20	Scheme for spices development - Coriander seed multiplication programme, Coimbatore.	
21.	Ecobehavioural studies on the white fly, *Bemisia tabaci* G. in polycrop ecosystem Coimbatore.	9.51
22.	SPIC Chair Endowment - Professor (Soil Science and Agricultural Chemistry), Coimbatore.	1.20
23.	Environmental risk assement of pesticides used in a hill area, The Nilgiris - Ooty	0.86
24.	*Medicinal plant based horti-sylviculture, Periyakulam*	0.72
25.	Establishment of a pilot plant for commercial production of biological control agents, Madurai and Coimbatore	21 00

26.	Investigations on the Bacterial Insecticides Bacillus (B.T.K.) and its efficacy in the control of certain important crop pests, Coimbatore	0.27
27.	Evaluation of biopesticide B. T. formulations for its safety to silkworm (*Bombyx mori*), Coimbatore.	0.27
28.	Seed technological evaluation for quality in cotton, Coimbatore	0.35
29.	Monitoring and surveillance of food contaminants hazards in India, Coimbatore	0.28
30.	Scheme on investigation on the microbiology of certain fruit *crop and developing suitable bio-fertilizers, Madurai*	1.30

State Government Schemes

1.	On farm water management studies, Bhavanisagar	3.68
2.	Use of microbial processes for restoration of shola forests in Nilgiris, Uthagamandalam	2.00
3.	Srtengthening of State Land Use Board in Tamil Nadu Agricultural University, Nucleus Cell, Coimbatore	1.75
4.	Production and distribution of vegatative hedge, fodder crops and fruit seedlings and providing training, Aruppukottai	1 00
5.	Training programme on improved Chulhas, Coimbatore	0.58
6.	Optimization of crop pattern for Periyar - Vaigai Project-Preparation of Linear Programme Models, Madurai	0.32
7.	*Scheme for undertaking the study on maximising the use* of water in crop production, Coimbatore	5.25
8.	Agricultural Development Project-Tamil Nadu (TNADP)-Seed Production by Tamil Nadu Agricultural University, Kumulur, Killikulam, Vamban and Palur	49.23
9.	Agricultural Development Project - Tamil Nadu (TNADP)-Integrated Watershed Development Component under World Bank Aid-Research component, Vellore and Athur	5.75
0.	Fodder research component under - TNADP - implementation with world bank assistance - Department of Forage Crops, Coimbatore	1.00

APPENDIX III

LIST OF BOOKS / BOOKLETS PUBLISHED

English

1. Sugarcane plant protection guide
2. Integrated pest control for sugarcane
3. Root borer - A new pest on sugarcane
4. Soil fertility in Shevroy Hills
5. A laboratory manual for biochemistry
6. Physiology of senescence
7. Integrated nutrient management in Tamil Nadu
8. A guide book on silkworm protection
9. Moriculture
10. Crop protection in moriculture
11. Environmental economics
12. Practical analytical chemistry
13. Proper use and handling of pesticides
14. Guide on forest entomology
15. Processing and preservation of fruits and vegetables
16. Physical constraints and management of red and lateritic soils of Tamil Nadu
17. Resources and management of soils of Dindigul Anna District
18. Improved crop varieties
19. Hybridization methods in millets
20. Agroclimatology
21. Use of potassium in Tamil Nadu
22. Principles of Agronomy
23. Lime products

24. Mango products
25. Soya products
26. Papaya products
27. All about weed control
28. Hand book on livestock production, dairy farming and forage production
29. Extension methods and their principles
30. Crop production in wet and garden land systems
31. A guide on vegetable culture
32. Kamala orange
33. Pests of hill crops
34. Brinjal cultivation
35. Moringa
36. Betelvine

Tamil

1. வெற்றிலைச் செல்வம்
2. கரும்பு சாகுபடி நுட்பங்கள்
3. பயறு உற்பத்தி
4. துவரை சாகுபடி
5. பயறு வகைகளில் களை நிர்வாகம்
6. பயறு வகைகளில் பூ உதிர்வதை தடுத்தல்
7. பயறு வகைகளுக்கு ஊட்டமேற்றிய தொழுஉரம்
8. காபி சாகுபடி
9. கன்று வளர்ப்பு
10. எள் சாகுபடி நுட்பங்கள்
11. எலுமிச்சை சாகுபடி
12. இலந்தை சாகுபடி
13. பழங்கள் பதனிடும் முறைகள்
14. கொத்தமல்லி சாகுபடி

15. நெல்லில் கருப்பு நாவாய் பூச்சி

16. களைக் கொல்லிகள்

17. மானாவாரி எள் மகசூலை அதிகரிக்க நவீன சாகுபடி முறைகள்

18. மானாவாரி மணிலா சாகுபடி தொழில் நுட்பங்கள்

19. ரோஜா சாகுபடி

20. தருப்பூசணி சாகுபடி

21. காய்கறி உற்பத்தி

22. திராட்சை பயிரில் ஒருங்கிணைந்த பயிர் பாதுகாப்பு முறைகள்

23. உயிர் உரங்கள்

24. மானாவாரி நிலங்களுக்கு ஏற்ற பழவகைகள்

25. வெங்காயம் சாகுபடி மற்றும் பயிர் பாதுகாப்பு முறைகள

26. கற்பகதரு - வேம்பு

27. பண்ணை நிர்வாக முறைகள்

28. நெல் சாகுபடி நுணுக்கங்கள்

29. நெல்விதை உற்பத்தி

30. மண் வளம்

31. மண் வளமும் உரப்பரிந்துரைகளில் புதிய வழிமுறைகளும்

32. தென்னை சாகுபடி

33. சூரியகாந்தி சாகுபடி குறிப்புகள்

34. நமது உணவில் சோயா மொச்சை

35. நிலக்கடலை சாகுபடி தொழில் நுட்பங்கள்

36. நெற்பயிரில் சாம்பல் சத்து நிர்வாகம்

APPENDIX IV

List of Research Papers Published

AGRICULTURE

Agricultural Biochemistry

1. Kasthri, R. and S. Sadasivam. 1991. Note on the effect of cutting on the mimosine in *Leucaena*. *The Indian Forester*, 117 (7) : 577 - 579.

2. Manickam, A. and A. K. Nandi. 1991. Storage albumin synthesis in developing mung bean seeds. *Proc. Soc. Biol. Chemists (India) Meeting*, Calcutta, Abs. 023.

3. Mohan, S., P. T. Palanisamy, K. Parvathy, B. Rajasekaran and M. Balasubramanian. 1991. Studies on the effect of defatted neem kernel powder for pulse beetle control. *Pestology*, XV (9) : 23 - 25.

4. Parvathy, K. and C. T. Devadas. 1991. Changes in the bio-chemical constituents with varying nitrogen supply and stages of harvest in pearl millet. *Quality Quarterly*, 3 : 16 - 18.

5. Sadasivam, S., S. Rajamaheswari and R Jeyarajan. 1991. Inhibition of certain plant viruses by plant extracts. *J. Ecobiol.*, 3 (1) : 53 - 57.

Agricultural Botany

1. Arumugachamy, S., P. Vivekanadan and M. Subramanian. 1991. Ratooning ability of some rice cultivars and hybrids. *IRRN*, 16 (1) : 7-8.

2. Arivudainambi, R., P. Vaidyanathan and A. Narayanan. 1991. Gene transfer using sub-lethally irradiated pollen in *Sesamum* spp. I. Tube growth after pollen irradiation. Golden Jubilee symposium on Genetic Research and Education : current trends and the next fifty years. Indian Society of Genetics and Plant Breeding. Abstract Vol. III, 864 - 865.

3. Christopher Lourduraj, A., T. S. Raveendran, T. Ganapathy, K. Rajamanickam and F. J. S. Kennedy. 1991. Status of coconut cultivation in Pollachi tract. *Indian Coconut Journal*, 22 (1) : 10 - 14.

4. Gomathinayagam, P., S. Natarajan and M. Subramanian. 1990. Genetic variability in drought tolerant genotypes of rice. *Oryza*, 27 : 328 - 330.

5. Govindaraj, P., M. Subramanian and Sukanya Subramanian. 1990. Genetics of yellow mosaic virus resistance in blackgram. Proceedings of symposium on innovation technique for the management of crop diseases, 17 - 18, Dec. 1990, AC & RI, Madurai.

6. Ganeshan, K., M. Maheswaran, T. Ramanathan and M. R. Sivaraman. 1991. GCH 4 castor does well in the rainfed region of Tamil Nadu. *Indian Farming*, 41 (3) : 13.

7. Ganesamurthy, K. and M. Stephen Dorairaj. 1991. Character association in pigeonpea. *Madras Agric. J.*, 77 (5 & 6) 201 - 204.

8. Jebaraj, S., S. Palanisamy and M. Subramanian. 1990. Genetic variability in rice panicle exsertion. *Oryza*, 27 (4) : 405 - 408.

9. Kandasamy, G., V. Manoharan and S. Thangavelu. 1991. Variability of matric traits and character association in sesame in two seasons. *Sesame and Safflower Newsletter*, 5 : 10 - 15.

10. Koodalingam, K and A. Ramalingam. 1991. Character association and component analysis in upland cotton (*Gossypium hirsutum L*). *Orissa J. Agric. Res.*, 3 (3-4) : 277-279.

11. Koodalingam, K., S. Rajasekaran and A. Ramalingam. 1991. Heterosis and inbreeding depression in interspecific upland cotton *(Gossypium hirsutum L)* *Ann. Agric. Res.*, 12 (3) : 294 - 297.

12. Mahalingam, L. and P. Vaidyanathan. 1990. Induced mutagenesis in pearl-millet - napier hybrid grass - Effect of gamma rays on root and shoot length at settling stage. *Forage Research*, 16 (2) : 113 - 118.

13. Mahalingam, L. and P. Vaidyanathan. 1991. Induced variability through acute fractional and recurrent gamma radiation in Pearlmillet - napier hybrid grass (*Pennisetum americanum x P. purpureum*). Golden jubilee symposium on Genetic Research and Education : current trends and the next fifty years, Indian Society of Genetics and Plant Breeding. Abstracts Vol. III : 675 - 76.

14. Manoharan, V. and S. Thangavelu. 1990. Gamma ray induced bold seeded early maturing groundnut selections. *Mutation Breeding Newsletter*, 36 : 7 - 8.

15. Manoharan, V., R. Sridhar and S. Thangavelu. 1990. Studies in root nodulation in groundnut. *J. Oilseeds Res.*, 7 : 140 - 142.

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23	5	Item 6	suggestions	suggesitons
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